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THE INVESTIGATION OF VISUAL AND AUDITORY REACTION TIME IN RACKET SPORTS BY SKILLS AND SEDENTARY

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Abstract:
Objective: Performance in racquet sports is closely related to both physical and psychomotor skills. Reaction time is one of the variables assessed in psychomotor skills and is the primary predictor of psychomotor performance evaluation. This study was designed to compare visual and auditory reaction time between badminton, table tennis and tennis players and non-sport sedentary. In addition, in this study, it was researched whether the gender of the athletes was effective on the response time of the players to auditory and visual stimuli. **Methods:** The study included 56 volunteers, including 36 athletes and 20 sedentary who actively participated in sports for at least 2 years in the badminton, table tennis and tennis skills between the ages of 18 and 30 years. Age, height, body weight, simple visual reaction time and simple auditory reaction time were measured. **Results:** When visual and auditory reaction times of racquet athletes and sedentary were compared, there was no significant difference between athletes in different branches, whereas sedentary had significantly higher visual and auditory reaction times than all branches ($p < 0.05$). No significant difference was found between the visual and auditory reaction times according to the genders of the same branch

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athletes (p> 0,05). However, both visual and auditory reaction times of sedantery women were found to be longer than that of males (p <0.05). **Conclusion:** The results have led to the belief that racquet sports develop neurocognitive brain functions.

Keywords: badminton, table tennis, tennis, reaction time

1. Introduction

Badminton, table tennis, tennis and squash, such as today's racquet sports, and in fact, many other sports, visual and audio cues quickly perceive the targeted motor response in a critical time period is important to be able to start. Racquet sports are characterized by short-term repetitive motor activity at high speed and intensity (1). During the competitions, the players must move quickly by changing the direction and (2) also the elite players must meet the maximum limits of speed, agility, flexibility, durability and power (3). As is understood, performance in racket sports is closely related to both physical and psychomotor skills. Although psychomotor skill is only one aspect of performance, it is the key to good performance. Therefore, preserving psychomotor skills during strenuous exercise is important for sports activities. Reaction time is one of the variables evaluated in psychomotor skills and is the primary predictor of psychomotor performance evaluation (4).

Many studies have shown that reaction time in athletes is much shorter than non-athletes (5, 6). In addition, badminton players have higher visuomotor skills than individuals who do not play racquet sports (7) and table tennis players have also shown that visual reaction time is shorter in table tennis players than in healthy sedentary (5). Reaction time may vary depending on factors such as age, gender, education level, type of stimulus, habit and alertness, fatigue, alcohol and nicotine, altitude and level of training (8).

The gender of the athletes and the comparison of reaction times show that men in almost every age group have a faster reaction time than women (9, 10). Studies in non-athletes have also found that men have a shorter reaction time than women (11).

Although there are visual reaction time researches in the literature comparing a few racquet sports or sedentary individuals, no study has been found to evaluate simple visual and auditory reaction time in badminton, table tennis and tennis sports. Therefore, this study was planned to compare visual and auditory reaction time with badminton, table tennis and tennis sports and non-sports sedentary individuals. In addition, it was investigated in this study whether the gender of the athletes were effective with the response time of the players to the auditory and visual stimuli.

2. Method

This study was started with the consent of the University of Gaziantep Clinical Research Ethics Committee with the permission and written informed consent numbered 2017/126. Thirty six males and 6 sedentary (10 females, 20 males, 6 females, 6 males), tennis (6 females, 6 males) and tennis (6 females, 6 males). Fifty six volunteers were included in the study. Age, height, body weight, simple visual reaction time, simple auditory reaction time were measured. None of the volunteers had upper and lower extremity or vertebral pathology. They also had no surgical operation until 6 months prior to the date of the measurements.

2.1 Anthropometric Measurements

The height of the athletes was measured with a 0.01m precision meter followed by a deep inspiration and measuring the distance between the head's vertebrae and foot. The body weight measurement was measured with an electronic scale of 0.1 kg. The age of the athletes is calculated by asking them the year.

2.2 Determination of Simple Visual and Auditory Reaction Time

The visual and auditory reaction times of the athletes (VRT and GRT) were measured using special software programs developed for reaction time measurement (www.humanbenchmark.com, www.cognitivefun.net) after appropriate environment and environmental conditions were minimized, where stimuli from the environment were minimized. In the first stage, the participants were familiarized with the test and after taking 10 readings. The arithmetic averages of the last five were evaluated and evaluated (12, 13).

2.3 Statistical Analysis

The SPSS package program 20.0 was used for the analysis of the obtained data (IBM SPSS Software 20.0, United States) One-Way ANOVA test for the comparison of more than two independent variables considering the suitability for parametric distribution, and the independent sample t test for the comparison of the two variables. $P < 0.05$ was considered statistically significant.

3. Results

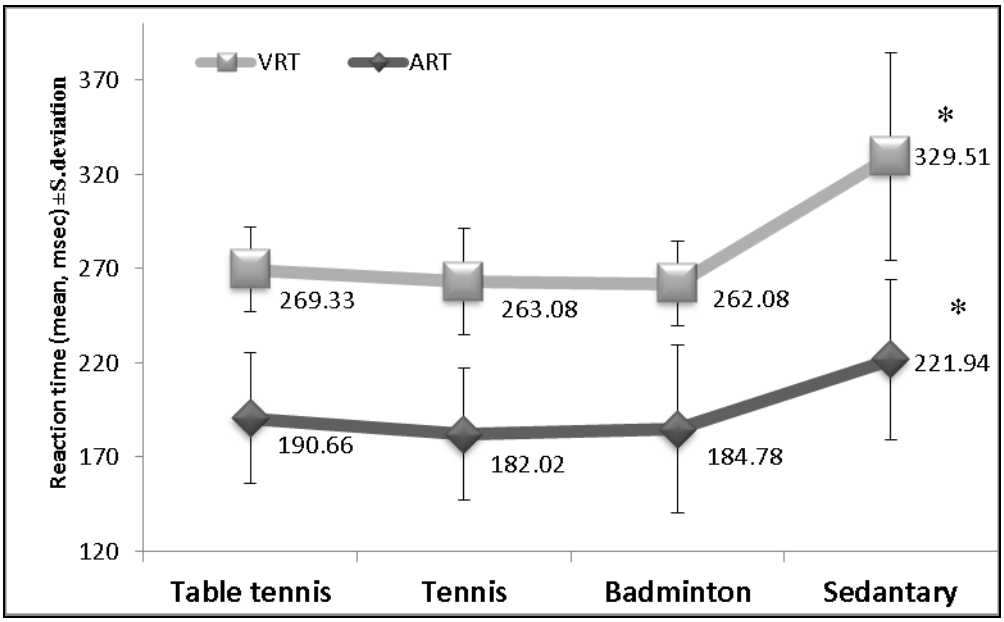
Anthropometric measurements of racket athletes according to their branches are given in Table 1. No significant difference was found between the anthropometric measurements as it was paid attention to the selection of individuals as close as possible when the groups were determined in the study (Table 1).

Table 1: Anthropometric measurements of athletes

	Group	Mean	S. Dev.	*p*
Age (year)	Table tennis (n=12)	22.33	2.57	0.731
	Tennis (n=12)	21.66	1.92	
	Badminton (n=12)	21.50	1.38	
	Sedentary (n=20)	21.70	1.80	
Height (cm)	Table tennis (n=12)	1.73	0.09	0.993
	Tennis (n=12)	1.74	0.12	
	Badminton (n=12)	1.73	0.10	
	Sedentary (n=20)	1.72	0.09	
Weight (kg)	Table tennis (n=12)	65.75	15.22	0.968
	Tennis (n=12)	65.50	13.54	
	Badminton (n=12)	65.91	11.78	
	Sedentary (n=20)	63.90	12.02	

* One-Way ANOVA test evaluated to all branches and p <0.05 was considered significant.

When the visual and auditory reaction times of racket athletes and sedantaries were compared with the average mile-seconds, there was no difference between the athletes in different branches, while sedentary had significantly higher visual and auditory reaction time than all branches (p <0.05). (Figure 1).



* Table tennis, tennis and badminton significantly. One-Way ANOVA test was evaluated and p <0.05 was considered significant.

Figure 1: Reaction times in racquet athletes and sedantaries

Visual and auditory reaction times of the athletes of the same branch according to their gender are compared in Table 2. No significant headlight could be detected among athletes (p> 0.05). However, both visual and auditory reaction times of sedentary women were longer than men (p <0.05) (Table 2).

Table 2: Reaction times of athletes according to gender

		Female mean	S.Dev.	Male mean	S.Dev.	*p*
Table tennis	VRT (msec)	266.8	28.2	271.8	16.9	0.72
	ART (msec)	203.5	30.0	177.7	36.2	0.21
Tennis	VRT (msec)	273.5	25.1	252.6	29.9	0.22
	ART (msec)	187.8	40.7	176.1	30.6	0.58
Badminton	VRT (msec)	261.1	29.1	263.0	15.4	0.89
	ART (msec)	187.1	47.5	182.4	45.8	0.86
Sedentary	VRT (msec)	353.8	58.3	305.2	41.4	0.04*
	ART (msec)	242.9	42.6	200.9	31.9	0.02*

* Independent sample t test was used to evaluate $p < 0.05$.

4. Discussion

This study is a study that evaluates simple visual and auditory reaction time between the branches of racquet sports (table tennis, tennis, badminton). In this study, it was investigated whether the gender of the athletes had an advantage or disadvantage in the branches they are interested in, how the reaction times were affected according to the athletes who were interested in the sports of the athletes who did not do sports.

In previous studies, visual and auditory reaction time was shorter in badminton players than in non-athletes healthy controls (14, 15). Mean reaction time values of table tennis athletes and the reaction time values of tennis athletes and non-athletes were significantly different (16). The study with experienced and novice tennis players (17) and the work we previously performed in elite and non-elite badminton players showed that elite or experienced athletes have shorter reaction time (12). As can be seen from the literature, the positive effect of the sport on the reaction time increases in connection with the duration of sports. Similarly, this study found that both the visual and auditory reaction times of the sedentary were significantly longer in all evaluated branches than in the athletes. Although there are studies that have been discussed above and there are shorter reaction time times than tennis players, there was no significant difference between tennis or table tennis and badminton players.

Studies comparing gender and reaction time show that men in almost every age group have a faster reaction time than women (9, 10). However, interestingly, there are studies showing that the difference in reaction times between men and women who exercise regularly is eliminated (18). In our study, it was observed that female athletes performed similar to males in all branches and reaction times. However, as in the literature, the visual and auditory reaction times of women were longer in men than in men. This may be an indication of the development of reaction time and neurocognitive functions in individuals interested in racquet sports. Some studies that support this finding suggest that physical activity will not only reduce cognitive brain functions, but also reduce the risk of chronic exercise in cognitive disorders related to aging (19-22).

5. Conclusion

As a result, badminton, tennis and table tennis branches were evaluated together with similar sports population and it was shown that there is no difference between the simple auditory and visual reaction times among athletes in this branch. In addition, although the sedentary women had a longer reaction time than men, there was no significant difference between men and women in racket athletes, and it was thought that racquet sports improved neurocognitive brain functions. Similar to other literature, worse reaction times of sedentary men and women than racquet athletes were also shown in this study.

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