

A Comparison of Reaction Times Between the Hearing-Impaired and Healthy Football Players

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Abstract: This study aimed at comparing the reaction times of hearing-impaired football players and healthy football players who do not have any hearing impairment in the same age group. 15 hearing-impaired football players with an average age of 18.13 ± 2.26 years and 18 healthy football players without any hearing impairment with an average age of 18.16 ± 1.54 years participated in the study on voluntary basis. The subjects were measured for their body height, body weight and reaction times. The Nelson Reaction Time Test was used in order to measure the reaction times. Reaction times of the subjects were measured in an environment which is fairly convenient for measurement and student t-test for independent samples was used to ascertain the difference between hearing-impaired football players and healthy football players without any hearing impairment. The $P < 0.05$ value was considered to be significant. It was observed as a conclusion of the study that, although the reaction time difference between hearing-impaired football players and healthy football players who do not have any hearing impairment was numerically in favor of the healthy players, only the foot reaction time difference was found to be statistically significant ($p < 0.05$). As a conclusion, it is considered that the relatively negative reaction times of the hearing-impaired football players stem from individual physiological differences.

Key words: Hearing-impaired • Football players • Balance • Reaction time

INTRODUCTION

Disability, or impairment, is the state of failure to adapt to normal life due to the loss of physical, mental, sensual and social faculties which can take place innately or as a result of an illness or accident [1]. It is one of the most important issues in Turkey today to ensure sports-participation of individuals with one or several physical, mental, spiritual, auditory or visual impairments which take place innately or as a result of an illness or accident. However, the exercise programs assigned in order to improve performance of the disabled people who do sport are supposed to be in accordance with their medical conditions [2]. Selection of the accurate exercise and training methods is an important criterion to increase the performance in any sportive game.

For success in sports, an athlete should display a high performance in terms of physiological and motor features. And one of the parameters to ensure that is the reaction time. Fox *et al.* expressed that athletes with high

performance were also the ones with better reaction times [3]. Given that titles are sometimes won or lost by one or two points, the importance of high concentrations of athletes on the game becomes more evident. It has been suggested that reaction times are improved with exercises [4-6]. There are plenty of definitions as to reaction time. The common point in these definitions is a stimulus and a response back to that stimulus [7-11]. More *et al.* found out in a study on reaction times that well-performing athletes had shorter reaction times than others did [12].

This study was conducted to compare reaction times of hearing-impaired football players and healthy football players who do not have any hearing impairment in the same age group.

MATERIALS AND METHODS

15 hearing-impaired football players (HIFP) and 18 healthy football players without any hearing impairment (HFPWHI) in the same age group and with similar

physical attributes participated in the study. The subjects were measured for their body height, body weight and reaction times. The ID information was taken as basis in defining the ages of players. Body height of the subjects was measured as bare foot, the head in upright position, the head on the Frankfurt plane (also known as the auriculo-orbital plane) and the measurement panel on the vertex of the head. After a deep inspiration, the distance between the vertex of the head and the base of the foot was measured and recorded with a Rodi Super Quality-brand meter in 1 mm sensitivity in cm terms. The body weight was measured as standard sports-clothes on (t-shirt and shorts) with a 100 g margin of error with a Premier-brand electronic weighing machine and recorded in terms of kg. The body-mass index (BMI) was calculated with following formula: the body weight and body height measurement values of the participating subjects, $BMI = \text{Body weight (kg)} / \text{body height (m}^2\text{)}$.

For measurement of reaction times, the Nelson Reaction Time Scale was used. In order to measure the reaction time for hands (RTH), the subjects sat down on a chair as their forearms and hands were loose on the table. Tips of their thumbs and index fingers were set ready as 8-10 cm distant from the table. The subjects were instructed to catch the scale with their thumbs and index fingers immediately after the test-administrator leaves the scale. The scale was left and the line from which subjects caught the scale with their thumbs was recorded. In order to measure the reaction time for feet (RTF), the subjects sat against the wall as their toes were 2.5 cm and their heels were 5 cm from the wall. The test administrator held the scale between the wall and the feet of the subjects and left the scale when the subject was ready. The subjects tried to grasp the falling scale by squeezing it between their toes and the wall. In order to measure the reaction time for two hands (RTTH) (motion speed), the subjects sat on the chair as their hands were leaning towards the side of the table. The little fingers were placed in 30 cm

distant to each other where palms were looking to each other. When the scale was released by the test administrator, the subjects tried to hold the scale between their two hands as fast as possible. In each of these three measurements, measurements were repeated for five times. The best and the worst values out of the five measurements were taken out and the mean value of the remaining three measurements was recorded as the distance where the scale fell down. The value read on the scale was calculated via the following formula and reaction times of the subjects were found accordingly [9].

- Reaction Time = $\sqrt{2 \times \text{Distance where scale falls} / \text{Gravity-dependent speed}}$
- Reaction Time = $\sqrt{2 \times \text{Distance (cm)} / 980 \text{ msec.}}$

In data evaluation, the SPSS (Statistical Package for the Social Sciences) software was used. The measurement results were presented in mean (M) and standard deviation (S_D). Shapiro Wilk test was made to determine whether the data displayed a normal distribution, as a result of which the distribution was found to be normal. As the data displayed a normal distribution, the independent sample t-test was used in order to determine the difference between HIFP and HFPWHI and the 0.05 value was considered to be significant.

Findings: An analysis of the tables would reveal that there was not a significant difference between hearing-impaired football players and healthy football players without any hearing impairment in the same age group in terms of physical variables as body height, body weight and body-mass index and although the reaction time difference was numerically in favor of healthy football players, only the feet reaction time difference was statistically significant ($p < 0.05$).

Table 1: Physical measurement values of hearing-impaired and healthy football players

Variables	Group	n	Mean \pm S_D	t	p
Age (year)	HIFP	15	18.13 \pm 2.26	-0.050	0.960
	HFPWHI	18	18.16 \pm 1.54		
Height (cm)	HIFP	15	172.00 \pm 6.62	0.172	0.864
	HFPWHI	18	171.50 \pm 9.45		
Body weight (kg)	HIFP	15	68.86 \pm 8.56	-0.575	0.569
	HFPWHI	18	71.05 \pm 12.47		
(BMI) (kg/m ²)	HIFP	15	23.22 \pm 2.07	-0.839	0.408
	HFPWHI	18	24.14 \pm 3.76		

Table 2: Reaction time measurement values of hearing-impaired and healthy football players

Variables	Group	n	Mean ± S _D	t	p
RTH (sn)	HIFP	15	0.243±0.049	1.330	0.193
	HFPWHI	18	0.234±0.029		
RTF (sn)	HIFP	15	0.267±0.063	2.493	0.018
	HFPWHI	18	0.247±0.041		
RTTH (sn)	HIFP	15	0.267±0.042	1.008	0.321
	HFPWHI	18	0.259±0.030		

DISCUSSION AND CONCLUSION

In this study, which aimed at comparing the reaction times of hearing-impaired football players and healthy football players who do not have any hearing impairment in the same age group, It was observed that, although the difference in reaction times between RTH and RTTH was numerically in favor of healthy football players, only the difference in RTF was statistically significant.

When the findings of this study were compared with the existing studies in the literature, it was seen that there were similarities as well as differences. Cigerci *et al.* [13] made a comparison of some physical and motor attributes of hearing-impaired subjects and subjects with no hearing impairment and stated that the hearing impairment adversely affected some motor attributes. Arinkan [14] examined the influence of educatory sportive games on physical development in hearing-impaired students and expressed that educatory games made positive contribution in physical attributes of hearing-impaired students. Bakır and Aydoğın [15] found in a study where they compared the simple auditory reaction times of the athletes of Gençlerbirliği Sports Club and visually-impaired students who do not do sports that regular physical exercise shortened the simple auditory reaction times. İlhan [16] examined the effect of physical education and sports activities on neurotic problem levels in 16 special education students who have light mental disability and found out that physical education and sports activities catered to the overall social, sensory, physical, mental and motor development in mentally-impaired children. A review of the literature shows that regular physical activities contribute in physical, physiological, psychological, sociological and motor development of children, which shows that regular physical exercise has an effect on both healthy and hearing-impaired individuals.

An analysis of the studies on the correlation between reaction time and performance reveals that regular physical exercise mostly affect this correlation positively [17] and there is a direct proportion between

success and reaction time [18]. It was emphasized that well-performing athletes had shorter reaction times than other athletes did [12].

It was stressed that the reaction time could be improved by regular exercise and training [6,8]. It was also indicated that that well-performing athletes had shorter reaction times [3]. In a study aiming at comparing the reaction times of hearing-impaired football players and hearing-impaired sedentary individuals, it was found that the reaction times of hearing-impaired football players were shorter [19].

As a conclusion, because, although the reaction time difference was numerically in favor of healthy football players, only the feet reaction time difference was statistically significant, it is considered that these two variables stemmed from individual physiological differences.

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