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The Comparision of the Balance, Breathing Capacity and Reaction Time of the Different Impaired Group of Athletes

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ABSTRACT The aim of this study is to determine the differences in the balance, vital capacity and reaction time parameters for impaired, sedentary and athletes. Vital capacity of the sedentary is statistically lower than that of all the impaired groups and athletes. The athletes' vital capacity is meaningfully higher than the physically impaired. The average of the right and left hand reaction time to the sound is statistically higher of the sedentary than that of the visually and the physically impaired and the athletes, meanwhile the average of the visually impaired is lower than the physically impaired. Balance, vital capacity and reaction time were found to be higher for the impaired who were active in sports compared to the sedentary. The impaired who are active in any sports must be encouraged to continue doing those activities.

INTRODUCTION

As a living entity human being is in mobility while he continues his development in his habitat. Movement is expressed as a change in position of any part of the body or full-body (Mengutay 1999).

It was reported that sports' ability to enhance development of the mental and physical capacity, motor skills, balance, and hand-eye coordination make a positive impact on both the education and career of the handicapped (Gur 2001).

Reaction time is one of the topics that the scientists have been most interested since the middle of the 19th century (Singer 1980). The reaction time is defined as the preparatory period required for the occurrence of the movement once the warning is made (Anson 1989). The essence of all physical movements includes basic elements such as strength, endurance, speed, flexibility and bio motor coordination. Depending on the sport these elements interact with each other in different weights and determine success based on the features of the sport branch. In addition, each affected element is under the influence of its subsections. The most important sub-element that affects the speed is the reaction time (Bompa 1998).

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Balance can be defined as the ability to maintain the posture of the body on the support area (Spirduso 1995). The balance provides the foundation for good performance. Human's ability to balance is a decisive factor in the development of other motor systems (Aksu 1994). Moraes et al. (2016) evaluated the effects of hippotherapy on seated postural balance, dynamic balance, and functional performance in children with cerebral palsy and compared the effects of 12 and 24 sessions on seated postural balance. In conclusion hippotherapy resulted in improvement in postural balance in the sitting position, dynamic balance, and functionality in children with cerebral palsy, an effect particularly significant after 24 hippotherapy sessions.

With training occurred, a significant change in respiratory volume and frequency. In addition, with training an increase takes place in maximal O2 consumption rate in aerobic metabolism in tissues called MaxVO2. People can always provide oxygen to the organism more than needed. Therefore increasing the oxygen availability, in other words, increasing the MaxVO2 through training is important (Tamer 1995).

Even though literature review was done in the related areas for comparing reaction time and other motor skills, the studies on balance and reaction time are known as new approaches in the literature. The aim of this study is to examine the effects of sports on the development of balance, reaction time, and respiratory capacity of different types of individuals with disabilities.

MATERIAL AND METHODS

Study Group

For this study, member of sports clubs and licensed athletes of visually impaired (n = 30), hearing impaired (n = 30), physically disabled (n = 30) and healthy athletes (n = 30) and sedentary (n = 30), totaling 150 volunteers participated.

Performance Measurements

Measurements were performed in the Ondokuz Mayis University Yasar Dogu Physical Education and Sports School Laboratories. Balance measurements were measured with CSM brand Prokin TecnoBody isokinetic balance meter, reaction time values were measured by MOART LaFayette reaction meter and vital capacity were measured with CSM Spirometrics tool.

Statistical Analysis

Statistical analyses of the data obtained in this study were performed using SPSS 15 software package.When comparing the groups, t test was used between independent groups and ANOVA was used to determine the differences between the groups. The value of $p<0.05$ was accepted as meaningful.

It can be seen from Table 1 that in terms of visual, right hand reaction time the sedentary groups' average is statistically higher than that of the visually impaired, physically disabled and athletes; meanwhile the mean value of visually impaired is statistically lower than that of the physically disabled ($p<0.01$).

As indicated in Table 2 it was determined that in terms of vital capacity values, there were significant differences between sedentary and other groups ($p<0.01$). The athletes' vital capacity values is significantly greater than physically disabled ($p<0.01$).

Table 1: Distributions of the reaction time of the subjects

Variables	*Groups*	*N*	*X*	*SD*	*F*	*P*
Sound Right Hand	Sedentary	30	0.366^{d}	0.10	76.247	0.000^{**}
	Visually impaired	30	0.201^{b}	0.04		
	Physically disabled	30	0.278^{c}	0.13		
	Hearing impaired	30	0.000^{a}	0.00		
	Athletes	30	0.219^{bc}	0.07		
Sound Left Hand	Sedentary	30	0.346^{c}	0.12	81.754	0.000^{**}
	Visually impaired	30	0.186^{b}	0.03		
	Physically disabled	30	0.236^{b}	0.08		
	Hearing impaired	30	0.000^{a}	0.00		
	Athletes	30	0.199^{b}	0.08		
Light Right Hand	Sedentary	30	0.335^{c}	0.11	74.012	0.000^{**}
	Visually impaired	30	0.000^{a}	0.00		
	Physically disabled	30	0.249^{b}	0.10		
	Hearing impaired	30	0.210^{b}	0.03		
	Athletes	30	0.215^{b}	0.05		
Light Left Hand	Sedentary	30	0.348^{c}	0.15	60.994	0.000^{**}
	Visually impaired	30	0.000^{a}	0.00		
	Physically disabled	30	0.264^{b}	0.10		
	Hearing impaired	30	0.200^{b}	0.04		
	Athletes	30	0.215^{b}	0.06		

Table 2: Vital capacity distribution of the subjects

Variables	*Groups*	*N*	*X*	*SD*	*F*	*P*
Vital Capacity	Sedentary	30	2.9688^{a}	0.693	22.854	0.000^{**}
	Visually impaired	30	4.4106^{bc}	0.849		
	Physically disabled	30	4.2833^{b}	0.884		
	Hearing impaired	30	4.4533^{bc}	0.945		
	Athletes	30	4.8759^{c}	0.740		

^{a,b,c}The difference between groups with different letters in the same column are significant ($p<0.01$).

Table 3: Distributions of eye-closed right-foot balance performance of the subjects

Variables	*Groups*	*N*	*X*	*SD*	*F*	*P*
Horizontal	Sedentary	30	3.20	5.560	1.313	0.268
	Visually impaired	30	3.70	5.540		
	Physically disabled	30	5.66	4.744		
	Hearing impaired	30	4.90	4.404		
	Athletes	30	5.50	5.811		
Vertical	Sedentary	30	-6.60[a]	11.084	7.733	0.000
	Visually impaired	30	-0.10[ab]	11.262		
	Physically disabled	30	7.26[c]	6.085		
	Hearing impaired	30	1.93[bc]	7.633		
	Athletes	30	-0.60[ab]	11.778		

[a,b,c,]The difference between groups with different letters in the same column are significant ($p<0.01$)

In Table 3 no statistically significant differences between the visually impaired and the athletes were observed, but significant differences were observed between the visually impaired and the other groups. A statistically significant difference was detected ($p<0.01$) between sedentary, physical and hearing disabled and all groups.

DISCUSSION

This study is carried out to compare the balance, respiratory capacity and reaction time values of the athletes who have hearing, sight and physical disabilities with healthy athletes and sedentary.

When Table 1 was examined it can be seen that in terms of visual right hand reaction time the sedentary groups' average is statistically higher than that of the visually impaired, physically disabled and athletes; meanwhile the mean value of visually impaired is statistically lower than that of the physically disabled ($p<0.01$). In terms of visual left hand reaction time values sedentary subjects have statistically higher value than the visually impaired, physically disabled and athletes ($p<0.01$).Visual left-hand values of sedentary subjects have been found to be significantly different from all groups ($p<0.01$). According to the data analysis it is believed that the visually impaired athletes because of their sensitivity to sounds and ability to transform a disadvantageous condition to advantage show superior reaction ability than the sedentary and athletes. Better reaction time of disabled athletes than that of sedentary individuals can be considered as a value that sport participation gives to the people with disabilities. The reason for the value of the disabled group athletes remaining slightly below than that of the athletes is thought to result from movement-related functional loss when playing sports and the type and level of disabilities.

When the subjects' right hand visual reaction values were examined, no statistically significant difference was found among the groups of the hearing impaired, physically disabled and the athletes. In terms of the Visual left-hand reaction time values of the groups, the average of sedentary group was statistically found to be higher ($p<0.01$) than those of visually impaired, physically handicapped, and athletes.

This difference may be due to the choice of their sports branches and their hand choice. According to the results it is believed that, because of the lack of hearing and therefore further developing vision, the hearing impaired's visual reaction time is better than the other type of disabled, sedentary and athletes. In line with our findings, Acak et al. research (2012) determined that best visual reaction times were in favor of hearing impaired athletes. It has been reported that at the end of measurements of visual reaction of right hand (244.42 sec), left hand (sec 249.30), right foot (sec 281.69) and left foot (279.44 sec) the athletes who were totally deaf had shorter reaction time compared to the athletes who could hear with the headphones.

Similar to the results of our study, Koc et al. (2011), has demonstrated the similarity of the reaction time between hearing impaired sedentary and football players.

Imamoglu and Kilcigil (2007), in the study called Reaction time vital capacity values and the lateralization of the distribution of left-handedness problem in the tiny players in Turkey reported that in the training of the players for the position, reaction time alongside technical and

tactical skills might be developed through workouts.

In this study, the disabled people having better reaction time than the sedentary can be regarded as those who have the habit of doing sports which creates value for the people with disabilities. On the other hand, the reaction time of the disabled group remains slightly below the athlete group and this may be interpreted as, depending on the type and level of disability, a reduction in their movement ability function to play sports.

As indicated in Table 2 it was determined that in terms of vital capacity values there were significant differences between sedentary and other groups ($p<0.01$). The athletes' vital capacity values were significantly greater than physically disabled ($p<0.01$).

According to Gozu (1988), during physical exercise muscles need more oxygen and at the same time physiological adaptation of the respiratory system emerges to meet the increased oxygen needs. Increase in respiratory parameters, depend on the type of exercise, and the development of the respiratory muscles depend on the elasticity of the bronchi and bronchioles and the lungs and chests' ability to expand. Tasgin and Donmez (2009) stated that there are some studies which accept that the application of exercise programs to individuals who have not completed their development showed positive effect on respiratory function and some studies deny that there is no such effect. Vital capacity values of the athletes, in this study, were found to be better than the all other groups.

In addition, among in all groups sedentary group statistically has the smallest average value of a vital capacity level and this is due to lack of regular sports activity. Even though, in terms of vital capacity and depending on the type and level of disability there are small differences between disabled groups but they are still better than sedentary subjects and this may due to the disabled's involvement in sports and the sedentary's non- involvement. The results of the study were found to be consistent with the results of Gozu (1988) and Tasgin and Donmez's (2009) studies on the people with disabilities who engaged in sports, sedentary and athletes.

When the horizontal balance performance in Table 3 was examined it was seen that there were no statistically significant differences among the groups of sedentary, visually impaired, physically handicapped, hearing impaired and athletes. Although, in the study, there were significant difference among the groups, when the results were analyzed it was found that horizontal balance of disabilities is better than that of the sedentary but lower than that of the athletes. As a result, during the closing of eyes and the right foot horizontal balance measurements taken, no significant difference among groups can be seen and this is thought to be not only due to the athletes, sedentary and disabilities' movement experience but rather more to do with anteroposterior plan and stress in all joints on bending.

When the subjects' vertical balance performances were examined in Table 3 no statistically significant differences between the visually impaired and the athletes were observed, but significant differences were observed between the visually impaired and the other groups. A statistically significant difference was detected ($p<0.01$) between sedentary, physical and hearing disabled and all groups. Significant difference for the vertical balance performance may be the result of different developments due to the fact that forward movement such as walking and running was carried on a line. However, it can also be said that the upright posture of the body may be the cause of this difference.

Gokmen (2013) pointed out that low or high density regular physical activity and training showed positive development on the involvers on the control of balance systems, particularly on the proprioceptive system. Cote et al. (2005) reported that postural control and dynamic balance are required for optimal performance in daily life and sports activities. Through balance workouts appropriate developments for the desired characteristic in athletes can be achieved and therefore the performance for the branches that require balance can be increased. Perrin et al. (2002), compared static balance test performance among the judo, dance, and control groups. They stated that in the blocked visual input conditions judokas showed higher performance than the dancers, high-level athletes demonstrated developing balance control associated with the requirements of each sport branch and they also reported that depending on the training of the athletes the balance performance can be improved. Moraes et al. (2016) evaluated the effects of hippotherapy on seated postural balance, dynamic balance, and functional performance in children with cerebral palsy and com-

pared the effects of 12 and 24 sessions on seated postural balance. In conclusion, hippotherapy resulted in improvement in postural balance in the sitting position, dynamic balance, and functionality in children with cerebralpalsy, an effect particularly significant after 24 hippotherapy sessions.

CONCLUSION

As a conclusion, balance, vital capacity and reaction time were found to be higher for the impaired who are active in sports compared to the sedentary. The impaired who do not get involved in any sports must be encouraged to do so.

RECOMMENDATIONS

Recommendation made on the basis of the results from this study is that similar studies on individuals with different disability types must be done and determining the limitation on the development of the individual with disabilities may be useful. In addition, the researchers believe that the studies should be conducted for different sports branches to reveal the positive impact and whether different sports branches make any contribution to the positive impact. Similar studies can be done with different ages and genders of sedentary, athletes and individuals with disabilities to examine the effects of doing or not doing sports on the variables of age and gender.

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