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18 Age Period's Effect on Balance, Agility, Reaction Time and Movement Speed on the Hearing Impaired People

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Abstract: In this study the comparison of the hearing impaired youth's, who are under and over 18 years old, agility, balance, reaction time and movement speed were done and 18 age period's effect on these parameters was researched. There were 33 under 18 and 23 over 18, totally 56 hearing impaired male participated to the study voluntarily. Volunteers' motoric characteristics such as; body weight, balance, agility, reaction time and movement speed were measured. In the determination of volunteers age identity information was taken into consideration, their heights were measured in terms of cm and weights were measured in terms of kg. For the measuring of the volunteers static balance performance the stork stand test, for the agility's measurement the t test, for the reaction time and movement speed the Nelson Reaction Time Scale were used. Measurements were recorded at the best degree by three times repeating. In the determination of the difference between groups in the independent groups the t test was applied and the continuity level was accepted as $p<0.05$. In the result of study it was determined that there was not a meaningful difference found in the body height, body weight, balance and agility performance between groups ($p>0.05$), in the hand, foot reaction time and movement speed values differences were determined meaningful for the people who are under 18 ($p<0.01$). Consequently, when the acquired findings were considered, it was seen that static balance and agility performances of the hearing impaired individuals were not depending on age and the reaction time and movement speed were depending on age factor. In results of these findings, it is thought that on the hearing impaired individuals depending on age's increasing the reaction time and hand-eye coordination develop. Again, there should be plenty of repetitive similar researches required.

Key words: Hearing Impaired · Balance · Agility · Reaction Time

INTRODUCTION

Human body feels need of continuing movement and communicate with his environment because of his innate characteristics. The skeleton carries on the movement by muscle systems and it provides communication by sense organs. Sense organs besides their function to make communication they are also center that help to movement of the muscle system and provide its balance [1, 2]. In result of losing physical, mental, emotional and social skills at specific levels innate or later because of an illness and cannot be adapted to normal life named as disabled [3]. People who have physical, emotional, mental, aural or visual disorders or ones that have more than one of these disabilities, providing their participation to the sports activities today is one of the most important issues [4]. The most important parameters in healthy and disabled people's daily life and increasing of their sportive performances are some basic motoric characteristics, which are also subject of our research, such as; agility, balance and reaction time.

Agility is a skill to control the body position right while changing position in set of movements [5, 6]. A sportsman who exhibits a good agility mostly has the

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monitoring qualities besides dynamic balance, spatial awareness and rhythm [7]. Balance is a complex process that includes many emotional, motor and bio-mechanic components' coordinated activities. In other words, during movement it is the skill of the providing of body's desired position [8]. Balance is separated to two as static and dynamic. While static balance which is the subject of our research is a skill to provide the body's balance at a specific place or a position, dynamic balance is the skill that provides the moving body's balance [9, 10]. Human's skill for providing balance for the developing of other motor systems and branches of elite sportsmen is a required for a successful performance and an important factor in the protection of body composition [11-15]. It is defined as the time that passes in the beginning of reaction time, beginning of the stimulant and beginning of reaction [16]. Nerves that play role in stimulant's reaching to neural system and response's reaching to effector organ, their being weak in transmitting speed and effector muscle's being quick or slow muscle qualities are different from human to human and brings out millisecond differences. Reaction time in humans is directly related to nerve transmitting speed [17-19]. And movement speed is the time that passes among beginning and ending of the movement. Uniting of reaction time and movement speed is called reaction time [16, 18].

In the light of this information under 18 and over 18 disabled individuals, who show similarities in terms of physical characteristics, their agility, balance, reaction time and movement speed characteristics were compared so the 18 age period's effect on these parameters were researched.

MATERIALS AND METHODS

Fifty six subjects including 33 under 18 years of age (<18) (16.84±0.97) and 23 over 18 years of age (>18) (19.52±0.73) hearing impaired male volunteers participated to the study. Volunteers' height, weight, static balance, agility, reaction time and movement speed were measured. In the determination of the volunteers' ages identity information was taken into consideration, their weights were measured in terms of kg, heights were measured in terms of cm. For measuring of volunteers' static balance performances Stork Stand Test was used [20]. In this test dominant of the volunteer was used and the balance time, which was provided without moving, measured. For the measuring of agility the T test was used [21]. With this applied test sportsmen's forward sprint, split to left-right and back run speeds were measured. For the measuring of hand reaction time (HRT), foot reaction time (FRT) and movement speed (MS) the Nelson Reaction Time Scale was used. In this test the time that passed in the beginning time of the stimulant and reaction was measured. The best degree was recorded by doing three repeating of measurements. Value that is read on the table calculated in the below formula, human subjects' reaction times were determined [16].

Reaction Time= v2 x Distance (cm) / 980 sec
Reaction Time = v 2 x Distance of Table / Speed depend on gravitation

In the analysis of datum the SPSS (Statistical Package for the Social Sciences) package program was used. If the datum show normal distribution or not, the Shapiro Wilk test was used and it was determined that the datum show normal distribution. Measurement results were presented as average and standard deviation. In the determination of the difference between groups on the independent groups the t test was applied and the meaningfulness level was accepted as $p<0.05$.

RESULTS

All of the sportsmen who attended to the study their values are given in tables. When the table was examined average belongs to age variance was 17.94±1.58 years age and average belongs to height variance was 170.83±8.66 cm and average belongs to body weight was seen 65.85±8.07 kg. Average belongs to agility parameter was 11.82±1.77 sec, average belongs to static balance was 48.80±31.34 sec, average belongs to hand reaction time was 0.21±0.012 mil sec, average belongs to foot reaction time was 0.24±0.014 mil sec and average belongs to movement speed was 0.24±0.013 mil sec (Table 1).

When Table 2 was examined it was determined that there was no meaningful difference exist among groups on the averages of height and body weight ($p>0.05$), difference in their ages there was a meaningful difference found ($p<0.001$).

When Table 3 and Figure 1 were examined, it was seen that there was not a meaningful difference among groups on the static balance and agility performance averages ($p>0.05$) and in hand, foot, reaction time and movement speed values the difference was in the favor of <18 group ($p<0.001$).

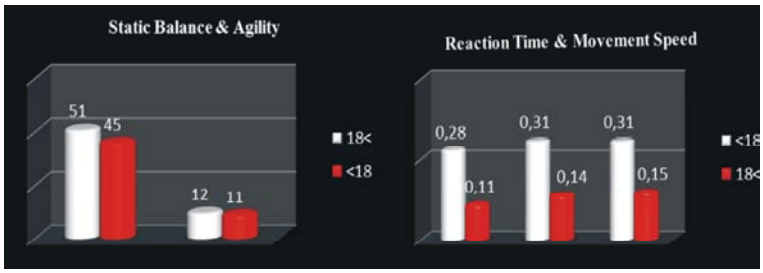

Fig. 1: Distribution of Chosen Motoric Characteristic of Human Subjects

Table 1: Distribution of Human Subjects Who Attended to Study (n=56)

Variable	Min	Max	Mean	S_D
Age (years)	15.00	21.00	17.94	1.58
Height (cm)	140.00	185.00	170.83	8.66
Body Weight (kg)	50.00	90.00	65.85	8.07
Static Balance (sn)	4.00	120.00	48.80	31.34
Agility (sn)	9.00	17.00	11.82	1.77
Hand Reaction Time (ms)	0.32	0.47	0.21	0.012
Feet Reaction Time (ms)	0.34	0.48	0.24	0.014
Movement Speed (ms)	0.30	0.48	0.24	0.013

Table 2: Distribution of The Physical Characteristics of Human Subjects

Variable	Group	n	Mean	S_D	t	p
Age (years)	<18	33	16.84	0.97	-11.162	0.000
	>18	23	19.52	0.73		
Height (cm)	<18	33	170.69	8.65	-0.146	0.885
	>18	23	171.04	8.87		
Body Weight (kg)	<18	33	64.69	6.73	-1.296	0.201
	>18	23	67.52	9.60		

Table 3: Distribution of Chosen Motoric Characteristics of Human Subjects

Variable	Group	n	Mean	S_D	t	p
Static Balance (sn)	<18	33	51.09	37.46	0.651	0.518
	>18	23	45.52	19.90		
Agility (sn)	<18	33	12.03	1.72	1.053	0.297
	>18	23	11.52	1.85		
Hand Reaction Time (ms)	<18	33	0.28	0.009	6.742	0.000**
	>18	23	0.11	0.009		
Feet Reaction Time (ms)	<18	33	0.31	0.010	5.699	0.000**
	>18	23	0.14	0.012		
Movement Speed (ms)	<18	33	0.31	0.009	5.144	0.000**
	>18	23	0.15	0.013		

DISCUSSION AND CONCLUSIONS

Balance, which is a complex process that includes many emotional, motor and bio-mechanic components' coordinated activities, it is one of the critical elements that facilitates the performance in functional skills and forming the basic of movement [22]. In this presented study balance was found out at the best degree on; under 18 individuals. Şirinkan [23] investigated the effect of sportive educational plays to the physical developments of hearing impaired individuals and in the result of research he specified that educational plays have positive effects on hearing impaired individuals' physical developments. Eliözand and his friends [24] carried out a study on healthy and hearing impaired football players and determined that static balance performance is better on hearing impaired football players when compared to sedentary. In the study of Ciğerci and his friends [25], they compared the hearing impaired and healthy human subjects' some physiologic and motoric characteristics and in the result of their study they determined that hearing impairment has negative effect on some motoric characteristics. When literature information is taken to consideration activities that are applied regularly they will help children to develop their physical, physiologic, psychological, sociologic and motoric characteristics. This study showed that activities that are applied regularly, they have positive effects on both healthy and hearing impaired individuals. In the literature there are studies showing that sportive activities have positive effects on hearing impaired children's physical performance and balance skills development, especially they increase the adaptive working of vestibular coordination structures with each other [26, 27].

Açak and his friends [28] compared hearing impaired futsal players' agility and visual reaction time, they determined that research group's agility test values; according to disability situation variance; there was a meaningful difference found between sportsmen that never hear and ones that can hear with hearing aid. This result showed that hearing impaired individuals' agility parameter shows difference according to disability degree.

In this presented study, it was seen that in under 18 and over 18 groups, there was not a meaningful difference found belonging to static balance and agility parameters. When the literature was examined, it was determined that there was a statistical meaningful relationship between agility and balance [9, 28]. From this viewpoint, agility and static balance performance's bringing out meaningful in; under 18 and over 18 groups show parallelism with literature information.

In this conducted study, it was brought out that depending on reaction towards stimulant on the hearing impaired over 18 individuals it was at a better degree. It is thought that this skill develops depending on age. Koç and his friends [29] researched the reaction time and movement speed of hearing impaired sedentary and hearing impaired football players and they determined that reaction time and movement speed is at a better level on hearing impaired football players. In their study, Bakır and Akdoğan [30] compared the visually impaired students', who do sports and not, aural simple reaction time, they determined that regularly doing of physical exercises shorten the aural simple reaction time and individuals who participate to the physical activity programs regularly their nerve-muscle system reactions quicken when it is compared to sedentary individuals that are at the same age.

Consequently, when these findings are taken onto consideration it is seen that hearing impaired individuals static balance and agility performances do not depend on age, but reaction time and movement speed depend on age. As a result of these findings, on the hearing impaired individuals depend on increasing of age it is thought that their reaction time and hand-eye coordination components develop. Again there should be plenty of repetitive similar researches required.

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