BALANCE STATUS OF IRANIAN ADULTS WITH VISUAL IMPAIRMENT

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Abstract
Introduction: Physiological characteristics and motor abilities are influenced by performing physical activities in typical subjects. However, it is not obvious whether individuals with visual impairment are affected significantly by physical contribution. The purpose of this study was to determine the physical and motor status of 20-34 year old male athletes or non-athletes with visual impairment in Iran. Methods: Sixty-four participants with moderate visual impairment were selected randomly and classified in two groups including goal ball athletes (n=31) and non-athletes (n=33). Anthropometric indicators such as body mass index (BMI), mass of body fat (MBF), Soft Lean Mass (SLM), and percent of body fat (PBF) were evaluated by body composition analyzer. Dynamic balance test was measured via a laboratory device. The data were analyzed using independent t test. Results: The participants with athletic background had a lower BMI, MBF, PBF and higher SLM than non-athletes. Furthermore, non-athletes outperformed the athletes in balance test. However, these differences were not significant between the two groups (P<0.05). Discussion: We can conclude that health related physical characteristics of the athletes with visual impairment were better than those of non-athletes, but they revealed a lower motor ability levels than non-athletes. Implications for Practitioners: Individuals even with visual impairment can take advantages with regard to body composition characteristics by being physically involved, but balance ability seems not to be influenced significantly by the sport participation and it needs specific interventions in such a population.

Key words: *balance ability, anthropometric indicators, visual impairment.*

Introduction

Health-related physical fitness is indicated through a variety of factors such as body weight status, cardiorespiratory fitness, musculoskeletal fitness and flexibility that are related to health indicators in youth (Institute of Medicine, 2012). Lack of adequate physical activity along with obesity in children and adolescents is a main concern for public health authorities all over the world. Although some strategies have recently been declared so as to provide this population with a healthier lifestyle, high prevalence of risk behaviors can still be observed that might cause negative effects later in life (Alhassan & Robinson, 2010; Bauman, 2004; Nelson, & Gordon-Larsen, 2006). Physical disability prevalence as sensory impairment consequences is expressed in the visual and auditory systems(visual, 2013). Children and adolescents with visual impairment possess lower contribution in physical activities (Houwen, Hartman, & Visscher, 2009; Aslan, Calik, &Kitis, 2012). Therefore, some investigations have demonstrated that individuals with visual impairment show lower levels of health-related physical fitness below the mean in contrast to typical subjects with similar age (Greguol, & De Rose Junior, 2009; Korach et al., 2000). Furthermore, numerous studies focused upon visual impairment level and balance but revealed mixed results (Haibach, Lieberman, & Pritchett, 2011; kkinen et al., 2006; Pereira, 1990; Johnson-Kramer et al., 1992; Ribadi et al., 1987; Wyver, and Livesey, 2003). No relationship was reported between visual impairment level and balance performances by Leonard (1969), where as other researchers indicated a relationship between balance and increased residual vision(Haibach et al., 2011; Pereira, 1990; Wyver, & Livesey, 2003). It has been demonstrated that blind individuals perform better than their typical counterparts wearing blindfolds indicating that subjects who are blind adapt to their condition (Haibach et al., 2011; Johnson-Kramer et al., 1992; Ribadi et al., 1987).However, a better balance performance was not reported in blind children compared to their blindfolded sighted peers(kkinen et al., 2006). Sports contribution is highly useful in developing youth's physical and mental health, social adjustment, and self-confidence (Solish, 2010). However, growing evidence of differences in sports participation exists between typical individuals and people with developmental delay (Hinckson, & Curtis, 2013). Since individuals with visual impairment are more obese and lack optimal fitness compared to their sighted peers (Hopkins et al., 1987), physical intervention is effective for possessing privileges in regard to the quality of life.

However, it is not obvious whether physical contribution can have any significant effect upon this population based on the impairment of the visual system. Thus, the purpose of this study was to determine the physical and motor status of 20-34 year old male athletes or non-athletes with visual impairment in Ardabil, Iran.

Methods

Participants
Seventy-eight male individuals withvisual impairment (mean age: 27.8 years, SD: 3.5) were selected randomly from well-being and rehabilitation center of Ardabil, Iran. They were divided into two groups of athletes (n=37) and non-athletes (n=41). Athletes were active performing goal ball sport for over 2 years, but non-athletes would use sedentary life style. Participants and their families were entirely informed about the study and provided written consent. The inclusion criteria was (visual acuity of 20/70 to 20/400) for male participants in the age range of 20-34 and exclusion criteria included musculoskeletal and neuropsychological disorders.

Six and eight participants were excluded as they possessed those problems in athlete and non-athlete groups respectively. The flow diagram is depicted based on Consort that is presented in figure 1. The study protocol received approval from the ethics committee of the University of Urmiathat follows tenets of the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects (http://www.wma.net/en/30publications/10policies/b3/).

Anthropometric indicators
Evaluation process of participants was conducted within a two-day period by the same researcher. The first day was assigned to anthropometric measurement and second day for motor ability test. Height (Holtain Ltd., Crymych, Dyfed, UK) as an anthropometric characteristicwas measuredto the nearest 10 mm using the techniques provided by Lohmann et al. (1988) and median value of three measures was considered as criterion.Body Mass Index (BMI), Mass of Body Fat (MBF), Soft Lean Mass (SLM), and Percent Body Fat (PBF) were measured while participants would stand barefootand without clotheson a body composition analyzer (Jebb et al., 2000).

Balance measurement
Motor ability of all participants was assessed after a short period of warm up using a laboratory device (Nourshahi et al., 2011). Individuals were asked to stand on a moving plate and keep it in a horizontal position (measuring dynamic balance test). A light embedded to the device had two colors such as green indicating balance and red showing non-balance status. When the plate couldn't be kept in a horizontal position, the light was switched to the red color indicating lack of balance. The best value of three attempts was the score of balance ability test.

Statistical analysis
Descriptive statistics (means and 95% confidence intervals) were performed for all variables. Normal distribution of all variables was checked using the Kolmogorov-Smirnov test. Independent ttest was used to determine the significance difference between the athletes and non-athletes. The level of significance was set at $p<0.05$. SPSS software was used for data analysis.

Results

Anthropometric and motor characteristics of the subjects are presented in Table 1. The participants with athletic background had a lower BMI, MBF, PBF and higher SLM than non-athletes. Furthermore, non-athletes outperformedthe athletes in balance test. However, these differences were not significant between the two groups ($P<0.05$).

Table 1 Physical and motor characteristics of the study participants

Variables	Athlete (n=31)		Non-athlete (n=33)	
	Mean	SD	Mean	
Height (m)	1.72	0.06	1.66	0.09
Weight (kg)	70.28	8.70	70.61	21.21
BMI (Kg/m^2)	23.67	2.63	25.39	7.49
Body fat (%) #	18.68	5.04	20.70	8.03
Soft Lean Mass (kg)	52.82	5.69	51.56	10.74
MBF (kg)	13.31	4.56	15.90	110.2
Dynamic balance (s)	46.45	8.30	49.15	10.95
Significant difference # $p< 0.05$ between athletes and non-athletes				

Discussion and conclusion

Growing evidence of differences in sports participation exists between typical individuals and individuals with developmental delay.Lack of adequate physical activity along with obesity in children and adolescents is a main concern for public health authorities all over the world. Thus, the purpose of this study was to determine the physical and motor status of 20-34 year old male athletes or non-athleteswith visualimpairment in Ardabil, Iran. To the best of our knowledge, no study has reported physiological and motor discrepancies among such individuals that this is the first study considering those variables. Both physical activity and sedentary behavior are related to health-related quality of life in

typical and patient individuals (Meneguci et al., 2015; Taricco et al., 2014). Visual system's malfunction is a restricting factor that limits people to be highly involved physically and decrease the quality of life as consequences. People with visual impairment are more obese and lack optimal fitness compared to their sighted peers (Hopkins et al., 1987). Therefore, it is not established if athletes with visual impairment can lose weight due to performing goal ball physical activities.We found that physical characteristics such as Body Mass Index (BMI), Mass of Body Fat (MBF), and Percent of Body Fat (PBF) were lower in athletes compared to non-athletes that are consistent with Greguol et al. (2014).It shows that even such a population can take advantages participating sport fields. Different researches have reported mixed results about the level of visual impairment and balance performance (Haibach, Lieberman, & Pritchett, 2011; kkinen et al., 2006; Pereira, 1990; Johnson-Kramer et al., 1992; Ribadi, et al., 1987; Wyver, &Livesey, 2003). Findings of a study also revealed that utilizing balance-training program significantly improved the dynamic balance of individuals with visual impairments relative to a control group (DavarpanahJazi, et al., 2012). However, we found relatively lower scoresof balance test in athletes compared to non-athletes. Thissmall difference might be due to the low body composition indicators including BMI and PBF of the athletes. Indeed, low center of gravity because of gaining more weight in non-athletes can help them to control their balance on the plate. Further and even more importantly, though, goal ball sport contributions don't seem to improve balance directly and participants need to be provided with specific balance interventions so as to enhance theirbalance ability and generalize it to laboratory devices. We can conclude that health related physical characteristics of the athletes with visual impairment were better than those of non-athletes, but they revealeda relatively lowermotor ability levels than non-athletes. Individuals even with visual impairment can take advantages with regard to body composition characteristics by being physically involved, but balance ability seems not to be influenced significantly by the sport participation and it needs specific interventions in such a population.

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STATUS RAVNOTEŽE IRANSKIH ODRASLIH OSOBA S OŠTEĆENJEM VIDA

Sažetak

Uvod: Fiziološke karakteristike i motoričke sposobnosti utječu na obavljanje fizičkih aktivnosti u tipičnim subjektima. Međutim, nije očito jesu li osobe s oštećenjem vida znatno pogođene fizičkim doprinosom. Svrha ovog istraživanja bila je utvrditi fizičko i motoričko stanje 20-34 godina starih muških sportaša ili ne-sportaša s oštećenjem vida u Iranu. Metode: Šezdeset četiri sudionika s umjerenim oštećenjem vida slučajno su odabrani i klasificirani u dvije skupine, uključujući golne kugle (n = 31) i ne-sportaše (n = 33). Antropometrijski pokazatelji kao što su indeks tjelesne mase (BMI), masu tjelesne masti (MBF), mekanu masu (SLM) i postotak tjelesne masti (PBF) procijenili su analizator sastava tijela. Test dinamičke ravnoteže mjeren je laboratorijskim uređajem.Podaci su analizirani neovisnim t testom. Rezultati: Sudionici s atletskom pozadinom imali su niži BMI, MBF, PBF i veći SLM od ne-sportaša. Nadalje, ne-sportaši su nadvladali sportaše u testu ravnoteže. Međutim, te razlike nisu bile značajne između dvije skupine (P <0,05). Rasprava: Može se zaključiti da su fizikalna svojstva sportaša s oštećenjem vida bolja od onih kod sportaša, ali su otkrili nižu razinu motoričke sposobnosti od onih koji nisu sportaši. Implikacije za praktičare: Pojedinci čak i sa oštećenjem vida mogu imati prednosti s obzirom na karakteristike sastav tijela fizičkim uključenjem, ali činjenica da ravnotežna sposobnost ne utječe znatno na sudjelovanje u sportu i da je potrebna posebna intervencija u takvoj populaciji.

Ključne riječi: *sposobnost ravnoteže, antropometrijski pokazatelji, oštećenje vida.*

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