European Journal of Physical Education and Sport Science
ISSN: 2501 - 1235
ISSN-L: 2501 - 1235
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.1112294 Volume 3 | Issue 12 | 2017

# COMPARISON OF THE BODY COMPOSITION AND SOMATOTYPE OF TURKISH AND FOREIGN COUNTRY NATIONAL TEAM TAEKWONDO ATHLETES

**Serkan Revan[i], Şükran Arikan,**
**Metin Şahin, Şükrü Serdar Balci**
Selçuk University,
Faculty of Sports Sciences,
Konya, Turkey

**Abstract:**
The objective of this study is the determination and comparison of the body composition and somatotypes of the elite level Turkish and foreign taekwondo athletes. Totally 93 taekwondo athletes, being 45 Turkish (27 male, 18 female) and 48 foreign (35 male, 13 female) in the age range of 17-27, taking part in the national teams of their countries participated in the study. Sportive ages, heights, body weights, body mass index, body fat percentages, and somatotype of taekwondo players were determined. The difference between the groups was analyzed by t test in independent groups. The analyses were conducted in the SPSS 16.0 package program and 0,05 was accepted as a significance level. No significant difference was determined between Turkish and foreign athletes in all the measured variables in the male and female athletes ($p>0.05$). It was determined in the study that Turkish male athletes were mesomorph-ectomorph and that of foreign male athletes were mesomorphic ectomorph, and that of Turkish and foreign female athletes were central. As a result, we can say that the Turkish and foreign national team taekwondo players have similar body composition and somatotype.

**Keywords:** taekwondo, somatotype, body composition

[i] Correspondence: email serkanrevan@gmail.com

## 1. Introduction

While the determination of body composition is a significant factor in terms of clinical health care, exercise science, and weight control, it also reflects the balance between eating habit and physical activity (Salmi, 2003). In these analyses, health states and dietary states of individuals are followed up and clinically significant information is obtained (Edefonti et al., 2001). It is known that the athletes competing in different sports branches have highly different body weight, height, muscle mass, fat-free body mass, fat percentage and even body proportion from each other, while body composition is related with performance (Bayraktar and Kurtoğlu, 2009).

As in other sports branches, branch-specific physical fitness is very important in taekwondo. Hence, the trainer in charge of a national team must take it into account and try to bring the physical fitness of the athletes to higher levels when they are preparing their team. Success in taekwondo depends on numerous factors. Therefore, successful taekwondo athletes need anthropometric and physiological properties at high level. In addition, they are required to have low body fat percentage, ability to exhibit their skills fast, and perfect agility for the rapid movements that ensure that they can react to the attack of their opponents fast and in a timely manner and that prevents their opponents from gaining scores (Abdossaleh, 2009; Zar et al., 2008). However, it was reported that performance of taekwondo athletes depends on alactic anaerobic power, explosive strength, flexibility, and aerobic power (Heller et al., 1998).

Somatotype is helpful in sports in which the body structure may affect performance (Gutnik et al., 2015). It is indicated that body structure can be used as a criterion for choosing and improving a talent in the taekwondo as well (Pieter, 2008). Determination of the body structures of elite athletes provides the coaches with significant information in the process of choosing talents. For this reason, the somatotype characteristics of many athletes in different branches have been followed for many years (Carter and Heath, 1990). The objective of this study is the determination and comparison of the body composition and somatotypes of the elite level Turkish and foreign taekwondo athletes.

## 2. Materials and methods

### 2.1. Subjects

Totally 93 taekwondo players, being 45 Turkish (27 male, 18 female) and 48 foreign (35 male, 13 female) in the age range of 17-27, participating the national teams of their countries that took part in the 4$^{th}$ European Club Championships held in Antalya on

18-20 February, participated in the study. The sportive ages, heights, body weights, body mass index, body fat percentages and somatotype of taekwondo players were determined.

### 2.2. Anthropometric measurements

The body mass index (BMI) was calculated by measuring the height (cm) and body weight (kg) of the athletes (ACSM, 2000). Biceps, triceps, subscapular and suprailiac skinfold thicknesses were taken using skinfold caliper (Holtain) and body densities were calculated to determine body fat percentage (BFP) (Durnin and Womersley, 1974). For the determination of the somatotype, the diameter measurements of the athlete group were determined with a Holtain compass and circumference measurements were performed with a non-flexible tape measure and calculations were made according to the Heath-Carter method (Marfell-Jones, 2003).

### 2.3. Statistical analyses

In the analysis of the data, arithmetic mean, standard deviation values were used. The difference between groups was analyzed by t test in independent groups. Analyzes were performed in the SPSS for Windows 16.0 package program and a significance level of 0.05 was considered.

## 3. Results

In all the variables measured in the male athletes, no significant difference between Turkish and foreign taekwondo players was determined ($p>0.05$, Table 1).

**Table 1:** Comparison of anthropometric characteristics of male Turkish and foreign athletes

| Variable | | n | Mean | SD | t |
|---|---|---|---|---|---|
| Age (years) | Foreign | 35 | 21,00 | 3,51 | -1,47 |
| | Turkish | 27 | 22,44 | 4,24 | |
| Sports age (years) | Foreign | 35 | 11,43 | 4,82 | -0,91 |
| | Turkish | 27 | 12,56 | 4,89 | |
| Body weight (kg) | Foreign | 35 | 67,97 | 10,95 | -1,92 |
| | Turkish | 27 | 73,59 | 12,05 | |
| Height (cm) | Foreign | 35 | 182,40 | 8,14 | -0,97 |
| | Turkish | 27 | 184,41 | 7,91 | |
| BMI ($kg/m^2$) | Foreign | 35 | 20,37 | 2,59 | -1,78 |
| | Turkish | 27 | 21,53 | 2,50 | |
| BFP (%) | Foreign | 35 | 9,15 | 2,58 | -0,77 |
| | Turkish | 27 | 9,59 | 1,67 | |

| | | | | | |
|---|---|---|---|---|---|
| Endomorphy | Foreign | 35 | 1,67 | 0,53 | -0,49 |
| | Turkish | 27 | 1,73 | 0,33 | |
| Mesomorphy | Foreign | 35 | 3,39 | 1,45 | -1,18 |
| | Turkish | 27 | 3,84 | 1,50 | |
| Ectomorphy | Foreign | 35 | 4,31 | 1,36 | 1,52 |
| | Turkish | 27 | 3,81 | 1,18 | |

BMI: Body mass index, BFP: Body fat percentage

In all the variables measured in the female athletes, no significant difference between Turkish and foreign taekwondo players was determined ($p>0.05$, Table 2).

**Table 2:** Comparison of anthropometric characteristics of female Turkish and foreign athletes

| **Variable** | | **n** | **Mean** | **SD** | **t** |
|---|---|---|---|---|---|
| Age (years) | Foreign | 35 | 21,00 | 3,51 | -1,47 |
| | Turkish | 27 | 22,44 | 4,24 | |
| Sports age (years) | Foreign | 35 | 11,43 | 4,82 | -0,91 |
| | Turkish | 27 | 12,56 | 4,89 | |
| Body weight (kg) | Foreign | 35 | 67,97 | 10,95 | -1,92 |
| | Turkish | 27 | 73,59 | 12,05 | |
| Height (cm) | Foreign | 35 | 182,40 | 8,14 | -0,97 |
| | Turkish | 27 | 184,41 | 7,91 | |
| BMI ($kg/m^2$) | Foreign | 35 | 20,37 | 2,59 | -1,78 |
| | Turkish | 27 | 21,53 | 2,50 | |
| BFP (%) | Foreign | 35 | 9,15 | 2,58 | -0,77 |
| | Turkish | 27 | 9,59 | 1,67 | |
| Endomorphy | Foreign | 35 | 1,67 | 0,53 | -0,49 |
| | Turkish | 27 | 1,73 | 0,33 | |
| Mesomorphy | Foreign | 35 | 3,39 | 1,45 | -1,18 |
| | Turkish | 27 | 3,84 | 1,50 | |
| Ectomorphy | Foreign | 35 | 4,31 | 1,36 | 1,52 |
| | Turkish | 27 | 3,81 | 1,18 | |

BMI: Body mass index, BFP: Body fat percentage

## 4. Discussion

The aim of the study was to compare body composition and somatotypes of elite Turkish and foreign taekwondo athletes. There was no significant difference between Turkish and foreign athletes in sports age, body weight, height, body mass index, body fat percentage and somatotype in both male and female athletes.

In the studies conducted on the Olympic athletes, the body mass index (BMI) values of the taekwondo athletes who received medals in the 2000, 2004, 2008 Olympic

Games and 2010 Youth Olympic Games were declared to be respectively 21.9; 22.4; 22.0 and 20.0 in males and respectively 20.8; 20.4; 21.0 and 19.1 in females (Kazemi et al., 2006; Kazemi et al., 2009; Kazemi et al., 2010; Kazemi et al., 2013). Ghorbanzadeh et al. (2011) found that the BMI values of male and female taekwondo players in the Turkish national team were 21.6 and 20.3 respectively, while those of the club taekwondo players were 20.6 and 20.2, respectively, and they remarked that there was no significant difference in the BMI values of the elite and non-elite taekwondo athletes. In this study, BMI were determined as 21.53 and 20.07 in Turkish and foreign male athletes, respectively, and 20.21 and 20.71 in female athletes, respectively. These values are harmonious with the values of the taekwondo athletes who won medals in the Olympic Games. Moreover, there was no significant difference between Turkish and foreign taekwondo athletes in both male and female.

Body fat is a significant determinant in terms of reaching optimal efficiency in physical performance, in addition to being a health criterion. Body fat percentage (BFP) of elite Turkish male taekwondo athletes was determined as 16.8 (Akın et al., 2004), that of the Taiwanese elite athletes as 15.3, that of the amateur athletes as 10.8 (Chang et al., 2007), and that of the German male athletes as 8.7 and of female ones as 15.8 (Fritzsche and Raschka, 2008). Ghorbanzadeh et al. (2011) determined the BFP in male elite taekwondo athletes as 11.8 and in female elite taekwondo athletes as 11.2, while they were 10.5 in the male non-elite athletes and 12.3 in the female non-elite athletes. In a different study, BFP in elite Croatian female taekwondo athletes was reported as 16.5 (Markovic et al., 2005). In this study, BFP were determined as 9.59 in male Turkish athletes and as 9.15 in foreign athletes and as 20.08 female Turkish athletes and as 20.33 in foreign athletes and no significant difference was found between the Turkish and foreign athletes in both males and females. It was found that the BFP of the male taekwondo athletes participating in this study was similar to that of the male taekwondo athletes competing in the other national teams, while the BFP of the female taekwondo athletes was higher. This difference is thought to be due to training variables or measurement methods.

Somatotype is the identification of the morphologic structure of a body. It is the determination of the muscularity (mesomorphy), adiposity (endomorphy), and thinness/slimness (ectomorphy) relations through scientific methods (Tamer, 2000). In this study showed a mean somatotype of 1.73-3.84-3.81 and 1.67-3.39-4.31 in males and 2.75-3.41-3.7 and 2.85-3.49-3.38 in females for Turkish and foreign athletes, respectively. Ghorbanzadeh et al. (2011) found Turkish elite taekwondo athletes to have somatotype of 2.58-2.63-3.51 in males and 2.4-5.08-3.63 in females. It was reported by Isaac et al. (2008) that the Spanish elite taekwondo players to have somatotype of 2.1-5.1-2.7 in

males and by Pieter (2008) that the American Youth National Team male taekwondo players to have somatotype of 2.19-3.96-3.83 and their female counterparts, of 2.88-3.24-3.41. In the studies of relationship between the somatotypes and elite taekwondo athletes, it was determined that Spanish male athletes were ecto-mesomorph (Isaac et al., 2008); male athletes in London were endo-mesomorph and female athletes were meso-endomorph (Chan et al., 2003), American youth male athletes were meso-ectomorphy and female athletes were central (Pieter, 2008), Turkish male athletes were central and female athletes were ecto-mesomorph (Ghorbanzadeh et al., 2011) in terms of body structure. In current study, Turkish male athletes were mesomorphy-ectomorphy, foreign male athletes were monomorphic ectomorphy, Turkish and foreign female athletes were central.

As a result, it can be said that the Turkish and foreign national team taekwondo athletes have similar body composition and somatotype characteristics. In addition, given the fact that somatotype is not a unique parameter for high level success in sports, it is necessary to take into consideration such factors as motor skills and psychological state that affect the performance of athletes.

**References**

1. Abdossaleh Z, 2009. Surveyıng Physical Fitness of the Adolescent Male Taekwondo Athletes of Iran National Team**.** Journal of Dow University of Health Sciences (JDUHS) 3 (1): 16-21.
2. Akın G, Özder A, Koca Özet B, Gültekin T, 2004. Elit Erkek Sporcuların Vücut Kompozisyonu Değerleri. Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi 44: 1125-134.
3. American College of Sports Medicine (ACSM), 2000. ACSM's Guidelines for Exercise Testing and Prescription. Sixth Edition. USA: Lippincott Williams&Wilkins.
4. Bayraktar B, Kurtoğlu M, 2009. Sporda Performans, Etkili Faktörler, Değerlendirilmesi ve Artırılması. Klinik Gelişim Dergisi 22(1): 16-24.
5. Carter JEL, Heath BH, 1990. Somatotyping: Development and Applications, Camridge University Press, Cambridge, p.289.
6. Chan K, Pieter W, Moloney K, 2003. Kinanthropometric profile of recreational taekwondo athletes. Biology of Sport 20: 175-179.

7. Chang W-G, Peng H-Y Tang, W-T, Changand J -S, Chen J-J, 2007. The anthropometric profile of Taiwanese male Taekwondo players. Journal of Biomechanics 40 (Supplement 2): S641.
8. Durnin JV, Womersley J, 1974. Body fat assessed from total body density and its estimation from skinfold thickness: measurements on 481 men and women aged from 16 to 72 years. Br J Nutr 32(1): 77-97.
9. Edefonti A, Picca M, Damiani B, Garavaglia R, Loi S, Ardissino G, et al., 2001. Prevalence of malnutrition assessed by bioimpedance analysis and anthropometry in children on peritoneal dialysis. Perit Dial Int 21: 172-9.
10. Fritzsche J, Raschka C, 2008. Body composition and the somatotype of German top Taekwondo practitioners. Papers on Anthropology 17: 58-71
11. Gutnik B, Zuoza A, Zuozienė I, Alekrinskis A, Nash D, Scherbina S, 2015. Body physique and dominant somatotype in elite and low-profile athletes with different specializations. Medicina (Kaunas) 51(4): 247-52.
12. Ghorbanzadeh B, Müniroğlu S, Akalan C, Khodadadi MR, Kirazcı S, Şahin M, 2011. Determination of Taekwondo National Team Selection Criterions by Measuring Physical and Physiological Parameters. Annals of Biological Research 2 (6): 184-197
13. Heller J, Peric T, Dlouhá R, Kohlíková E, Melichna J, Nováková H, 1998. Physiological profiles of male and female taekwon-do (ITF) black belts. J Sports Sci 16(3): 243-9.
14. Isaac ET, Octavio AS, Coral FP, Isabel CF, 2008. Somatotype of male taekwondists. A study on spanish national team**.** Actividad Fisica Y Salud. Año VII- VOLUMEN VII Nº 14: 81-86.
15. Kazemi M, Waalen J, Morgan C, White AR, 2006. A profile of olympic taekwondo competitors. J Sports Sci Med 1;5(CSSI): 114-21.
16. Kazemi M, Casella C, Perri G, 2009. 2004 Olympic taekwondo athlete profile. J Can Chiropr Assoc 53(2): 144-52.
17. Kazemi M, Perri G, Soave D, 2010. A profile of 2008 Olympic Taekwondo competitors. J Can Chiropr Assoc 54(4): 243-9.
18. Kazemi M, De Ciantis MG, Rahman A, 2013. A profile of the Youth Olympic Taekwondo Athlete. J Can Chiropr Assoc 57(4): 293-300.
19. Marfell-Jones M. Kinanthropometric Assessment, 2003. New Zealand: Guidelines for Athlete Assessment in New Zealand Sport.
20. Markovic G, Misigoj-Durakovic M, Trninic S, 2005. Fitness Profile of Elite Croatian Female Taekwondo Athletes. Coll. Antropol 1: 93–99.

21. Pieter W, 2008. Body Build of Elite Junior Taekwondo Athletes. Acta Kinesiologiae Universitatis Tartuensis 13: 99-106.
22. Salmi AJ, 2003. Body composition assessment with segmental multifrequency bioimpedance method. J Sports Sci & Med 2: 1-29.
23. Tamer K, 2000. Sporda Fiziksel- Fizyolojik Performansın Ölçülmesi ve Değerlendirilmesi. Bağırgan Yayımevi, Ankara.
24. Zar A, Gilani A, Ebrahim KH, Gorbani MH, 2008. A Survey of The Physıcal Fitness of The Male Taekwondo Athletes of The Iranian National Team, Facta Unıversıtatıs Series: Physical Education and Sport 6(1) : 21 – 29.