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ORIGINAL ARTICLE

Sexual dimorphism of anthropometrical measurements in judoists vs untrained subject

Dimorphisme sexuel des mesures anthropométriques chez les judokas versus sédentaires

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KEYWORDS

Sexual dimorphism;
Body composition;
Somatotype;
Judoist;
Untrained subjects

Summary

Objectives. – This study aims to evaluate the sexual dimorphism in the body composition and somatotype of Polish elite judoists and comparison with untrained subjects.

Subjects and methods. – Twenty-two males and 12 female judoists have participated in this study. Their ages and judo experiences are respectively 23 vs. 22 years old and 12 vs. 11 years. Ten required measurements were taken to establish the individual's somatotypes (SiberHegner Machines SA, Zurich, Switzerland instruments). To compare the 165 males and 153 females untrained, abdominal skinfold thickness was measured with Skinfold Caliper. Mean height and weight, somatotype and body mass index, fat free mass index, fat mass index, and fat percentage were calculated. The two-step ratio of sexual dimorphism index (SDI) was used.

Results. – Sixteen out of the 21 measurements and anthropometric indices showed a reduction of sexual dimorphism in judoists compared with the untrained subjects. Highest differences were found in the fat mass and fat percentage. Conversely, a very low difference of SDI was observed for height-weight ratio, ectomorphy, fat free mass percentage and calf girth. Average SDI in untrained subjects was higher than in judoists.

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MOTS CLÉS

Dimorphisme sexuel ;
Composition corporelle ;
Somatotype ;
Judoka ;
Sédentaire

Résumé

Objectif. — Évaluer le dimorphisme sexuel de la composition corporelle et somatotype de l'élite polonaise de judo et les comparer avec des sédentaires.

Sujets et méthodes. — Trente-quatre judokas (22 hommes et 12 femmes) ont participé à notre étude. Leur âge et leur expérience sont respectivement de 23,1 versus 22,2 ans et 12,7 versus 11,0 ans. Afin de déterminer les somatotypes individuels et les comparer avec des sédentaires (165 hommes et 153 femmes), dix mesures ont été prises (SiberHegner Machines SA, Zurich, instruments Suisse), le pli cutané abdominal a aussi été mesuré. La moyenne de la taille et du poids, les somatotypes et l'indice de masse corporelle, l'indice de masse maigre, l'indice de masse grasse et le pourcentage de la masse grasse corporelle ainsi que les deux indices du dimorphisme sexuel (IDS) ont été calculés.

Résultats. — Seize sur 21 mesures et indices anthropométriques calculées ont montré une réduction du dimorphisme sexuel chez les judokas versus sédentaires. Des différences significatives ont été observées pour la masse grasse et le pourcentage de graisse. Toutefois, une faible différence de l'IDS a été relevée pour le rapport taille-poids, ectomorphe, le pourcentage de la masse maigre et la circonférence du mollet. L'IDS est moins important chez les judokas que chez les sédentaires.

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1. Introduction

According to diverse theoreticians, there is a difference between sex and gender. Sex refers to the biological or anatomical differences between males and females while gender has a more social meaning referring to the fact of being a male or a female [1]. In judo, athletes with different body size might be observed, since competitions at this time are held in seven weight categories for both male (under 60 kg, 66 kg, 73 kg, 81 kg, 90 kg, 100 kg and plus 100 kg) and female judoists (under 48 kg, 52 kg, 57 kg, 63 kg, 70 kg, 78 kg and plus 78 kg).

Field experience shows that the judoists who have better performance in strength exercises are not necessarily the most effective in judo combat i.e., it is technical, tactical and psychological factors which determine a success [2]. The temporal structural analysis of judo fight showed that the effective time of combat was on average 3 min 6 sec for males and 2 min 54 sec for females [3]. The training program should contain exercises requesting aerobic and anaerobic metabolism to increase the chance to win. The judo competition rules were changed in 2003 and require since then 5-minute period in both male and female combat and the proposal of extra time and so called golden score gained in case of equality [4]. Consequently, the same physiological and psychological efforts are comparables for both male and female in judo fight.

Although there are ca. a hundred sport techniques in judo, everyone can choose between them according to their own preferences (Tokui-waza). Information about both somatic and performance traits is necessary to develop a champion model and to determine the training-oriented goals [5]. According to Carter and Heath [6], somatotype determines the suitability to practice a particular sport discipline. Specific structural and functional changes are observed both in persons who do hard physical work and in athletes. These adaptation changes, which occur in ontogenesis as a result of interaction of the external environment, referred to adaptability [7]. As results from the studies on four male teams, judoists showed similar body build [8]. Few studies compared the characteristics of male and female

judoists to the body build [9–13], fitness abilities [9,14–21] technical and tactical level [3] or motivation [22].

This study aims to respond to the double interrogations: which trait and body build indices permit to distinguish the elite judoists from untrained subject? Does the sexual dimorphism induce significant differences in body build between these two groups?

2. Methods

2.1. Subjects

Thirty-four judoists members of the national judo team, who are training in Polish Olympic Training Center in Zakopane were informed about the purpose of this investigation. They gave their agreement for a standardized sport interview encompassing their sport careers and current achievements, fighting techniques and taking anthropometric measurements. Protocols and procedures were included into a broader PhD thesis project 'Differentiation of Combat Sports Competitors Body Build' approved by the Council of the Faculty of Physical Education at the University School of Physical Education in Kraków. General characteristics of the studied male ($n=22$) and female judoists ($n=12$) are presented in Table 1. They all have similar age. In this study, 23 judoists (15 males and 8 females) were overweight (1.0–13.7% of body weight) compared to the upper limit for weight category, required by the competitions they take part in. Measurements for males were taken three weeks before Judo European Championships Düsseldorf (2003) and females were taken four weeks before European Judo Championships Bucharest (2004). The both groups were evaluated during special period of training.

2.2. Anthropometric measurements

Body adiposity was measured using a Holtain caliper with a contact surface pressure of 10 g·mm⁻². To determine somatotypes, 10 required measurements were used: body height and mass, four skinfold thickness (triceps, subscapular,

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