42 - ANTHROPOMETRIC CHARACTERISTICS AND BODY COMPOSITION IN KARATE ATHLETES

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INTRODUCTION

While the quantity of martial artists in the world increases, there is a growing number of studies that evaluate the body composition of athletes in these modalities (BERCADES & PIETER, 2009), (BETANCOURT, AÉCHIGA & CARVAJAL, 2009). Since it is generally athletes who compete in categories weight defined too, the weight increase due to the accumulation of fat could decrease its performance (DE LORENZO, ET AL, 2000). Among the anthropometry procedures in about body fat evaluation, the somatotype is already widespread and standardized in various sports (MORTATTI & ARRUDA, 2007), (CABRAL ET AL, 2011). The knowledge of somatic and anthropometric variables is commonly used for designing training unfolds, with specific methods for each sport of martial art requirement in competitive sport. The specialized information about the components of monomorphic, endomorphic and ectomorph in karate fighters is still scarce (STERKOWICZ-PRZYBYCIE, 2010). A few recent studies have investigated the prevalence of Karate biotype (AMUSA & ONYEWADUME, 2010), (GIAMPIETRO, PUJIA, & BERTINI, 2003), thus having a greater need to know about the active population who participates in competitions. Thus, the aim of this study was to evaluate the anthropometric measurements and record the somatotipologic profile of regional Karate fighters to describe their biotype, comparing with specific studies.

MATERIALS AND METHOD

Twenty male athletes, practitioners of Shotokan Karate aged 27 ± (12,7) years and at different grade levels. All participants provided informed consent.

The measured anthropometric variables were: body mass (kg), height (m), wingspan (m) and skinfolds (triceps, pectoral, subscapular, and supra iliac). To evaluate the body fat mass was used Petroski's (1995) Equation applied to men 18 to 61 years of age where: D = 1,10726863 – 0,00081201 (subescapular + tríceps + suprailíac + Calf) + 0,00000212 (subescapular + tríceps + suprailíac + Calf)2– 0,00041761 (age in years). For skinfolds measurement, was used a compass (caliper) Scientific brand LANGE® (Cambridge Scientific Industries Inc.), with 1 mm accuracy. The procedures for skinfolds collection were performed according to the standardization proposed by Harrison et al (1988). The measurements of skinfold thickness and circumference measurements were taken on a rotational and collected three times, considering the mean values. To evaluate the body fat mass by bioelectrical impedance (BIE) a body composition analyzer was used Omron model HBF-306INT. The procedure to evaluate this, athletes remained standing with arms outstretched in front and holding the device with both hands until test end.

For the somatotype determination was used the procedure described by Heath and Carter (1990). In the measure of the stature, was used a vertical stadiometer, with 210 cm height with a 0,1 cm wide, while for the evaluation of body weight was used a platform scale, digital, Filizola ® calibrated graduated with 0-150 kg range and with a precision of 0.1 kg. The perimeter measurements of arm and leg measure, was used a anthropometric tape with 1 mm precision, and for the collection of measures breadths of the humerus and femur, a caliper was used Cescorf with 60 cm blunt tips and precision 0,5. The somatotypes determination components (endomorphic, monomorphic and ectomorph) and its comparisons within and between groups was performed using the program (software) SOMATOTYPE calculation and analysis© 2001 - Sweat Technologies, procedure described by Carter et al. (1983) that analyzes the somatotype individual and groups through interpretive model (SAD - Somatotype Attitudinal Distance).

The Body mass index (BMI) was calculated based on body weight and height, evaluated each athlete, is determined by calculating the ratio between total body mass in kilograms per height squared in meters BMI = weight (kg) / height (m)2. The measurement was recorded to one decimal place.

For statistical evaluation were used average, standard deviation and Student's t-test to identify statistical differences between body fat methods. The significance level was $p \leq 0,05$. The software used was Statistical Package for the Social Sciences (SPSS 10.0).

RESULTS AND DISCUSSION

The table 1 shows descriptive statistics and measurements used in this study.

Table 1 – Average and standard deviation of the variables.

Variables	Average	standard deviation
Age (decimal)	23,5	5,3
Height (m)	1,7	0,07
Body Weight (m)	71,2	16,2
BMI (Kg/m^2)	24,3	4,0
Σ 5DC* (mm)	69,1	35,1
% Fat	16,6	6,8
% Fat BIE	14.2	4.7
Endomorphic	4,1	1,5
Mesomorphic	4,0	1,2
Ectomorphic	1,8	1,2

* Sum of five skinfolds(subscapular, triceps, suprailíac, thigh and Calf)

After of all athletes somatotype analysis was obtained the following somatotipogram shown in Figure 1.

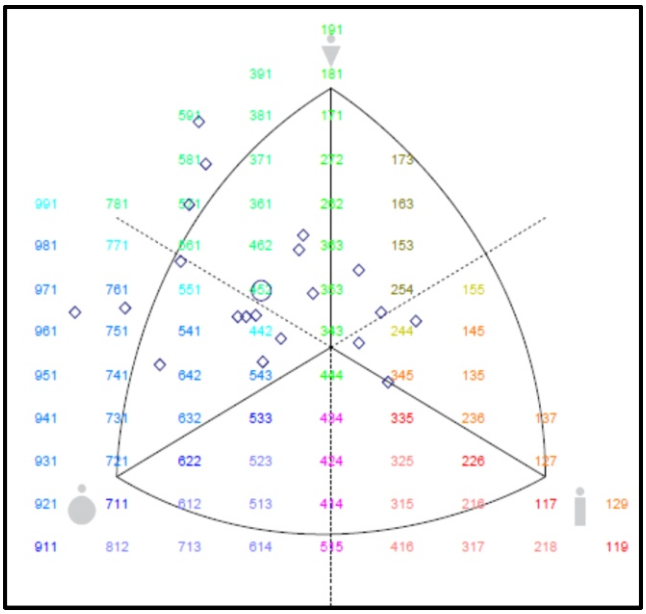


Figure 1: Athletes Somatotipogram

The somatopoint athletes arrangement was evaluated in accordance with the percentages for each somatotype which are represented at somatotipogram (coordinate system that allows a distribution overview of each individual somatotype) are shown in Figure 2.

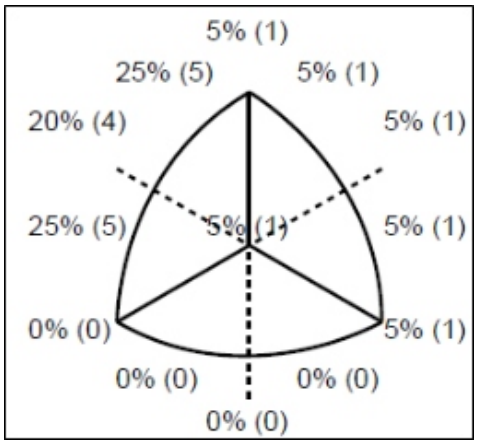
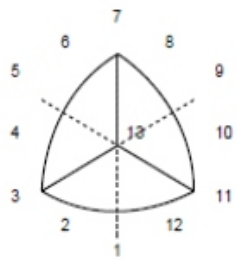


Figure 2. Athletes Somatotipograph and their respective percentages

There is a greater tendency of individuals meso - endomorphic, corresponding fourteen of twenty evaluated. The figure 3 shown the somatotype classifications possibility according to the somatopoint indication.

14) Endomorphic ectomorphic
15) Ecto – endomorphic
16) Endomorphic balanced
17) Meso – endomorphic
18) Mesomorphic – endomorphic
19 Endo – mesomorphic
20) Mesomorphic balanced
21) Ecto - mesomorphic



22) Mesomorphic - ectomorphic
23) Meso - ectomorphic
24) Ectomorphic balanced
25) Endo – ectomorphic
26) Central

Table 2 shows studies of somatotype evaluating of karate athletes and mesomorph, endomorph and ectomorph values.

Table 2 – Comparative table of somatotypes in male karate athletes.

Study	Somatotype ENDO MESO ECTO
This Study	4.1 – 4.0 – 1.8
Pieter & Bercades (2009)	2.4 – 4.7 – 2.5
Fritzsche & Raschka (2007) (elite)	2.0 – 3.7 – 2.7
Fritzsche (2006)	2.3 – 4.9 – 2.9
Giampietro Pujia & Bertini (2003) (elite)	2.1 – 3.5 – 3.1
Giampietro Pujia & Bertini (2003)	2.6 – 4.2 – 2.7
Amusa & Onyewadume (2001) (elite)	2.5 – 3.9 – 3.0
Krawczyk et al. (1997)	3.0 – 5.0 – 1.8
Claessens et al. (1986) (elite)	2.6 – 5.2 – 2.6

The average values of endomorph in our study were higher than in all Karate Fighters studies (see table 2). By comparison to Giampietro, Pujia & Bertini (2003) study, the endomorph average in our study was higher, while the monomorphic average was lower approaching the novice athletes values. The ectomorph averages in our study were very similar to those found in Krawczyk et al. (1997) study. The highest values of ectomorph were found for the study by Amusa & Onyewadume (2001). The average athlete's age evaluated in this study is very similar to other studies. Taking into account that the groups are formed by same sport practicing with similar mean age, we can relate why the somatotype predominance, which are so close between the reviewed studies and this study. The biggest somatotype differences between reviewed studies and this study was in the mesomorph. This fact could be related to height and body weight differences our study were lower compared to Sterkowicz-Przybycień (2010), and Amusa & Onyewadume (2001) studies. There appears to be certain similarity in somatotype values between elite athletes studies (FRITZSCHE & RASCHKA, 2007), (GIAMPIETRO PUJIA & BERTINI, 2003) and (PIETER & BERCADES, 2009). In our study, the average value for endomorph showed higher value compared to mesomorph. This is probably happening because in our study athletes were not separated by graduation and time of practice.

BMI values in our study were higher than in others studies (SILVA ET AL, 2012), (GIAMPIETRO PUJIA & BERTINI, 2003) (DEL VECCHIO, MICHELINI & GONÇALVES, 2005), e (AMUSA E ONYEWADUME, 2010), and the athletes are at overweight range. Table 3 shows the BMI and body fat percentage values of this and other studies.

Table 3 - BMI and body fat percentage comparison Chart in male karate athletes

Study	BMI	% Fat
This Study	24,3±(4,0)	16,6±(3,8)
Amusa & Onyewadume (2001) (elite)	22,0±(2,5)	12,2±(4,6)
Giampietro Pujia & Bertini (2003) (elite)	22,3±(1,7)	8,2±(2,4)
Rossi & Tirapegui (2007)	-	10,5±(7,7)
Silva et al (2012)	22,7±(3,6)	20,3±(8,6)

The body fat percentage values measured by skinfold technique and BIE showed no statistically significant differences (p = 0,07). The body fat percentage in our study showed higher values (GIAMPIETRO PUJIA & BERTINI, 2003) and (ROSSI & TIRAPEGUI, 2007) researches, however lower than the study of Silva et al (2012).

CONCLUSION

There seems to be no predominance of ectomorph and endomorph biotype in elite a Karate Fighters. This would be the most common biotype after years of work and training. In our study, we could not identify it, probably due to heterogeneity of sample.

More studies linking time practice and other anthropometric factors are needed to better ideal biotype understanding in karate fighters.

Despite being an important factor, the BMI was not a good parameter to identify the anthropometric characteristics of karate athletes, the body fat percentage seemed the more consistent in relation to other studies. The BIE seemed to be a good and quick application method with satisfactory results as accurate as skin folds, however, the use of only one method would not be indicated to determine the anthropometric karate athletes factors.

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ANTHROPOMETRIC CHARACTERISTICS AND BODY COMPOSITION IN KARATE ATHLETES

ABSTRACT

The aim of this study was to evaluate the anthropometric measurements and record the somatotipológic profile in regional karatekas in intending to describe their biotype. 20 male athletes practicing Shotokan Karate aged 27 ± (12.7) years and at different grade levels. Anthropometric variables measured were: body mass (kg), height (m), wingspan, body fat percentage by skinfold thickness and bioelectrical impedance (BIE). For the determination of the components of somatotypes (endomorph, mesomorph, ectomorph), was used the somatotype© software. And the Body Mass Index (BMI). The results showed that there is a greater tendency for meso - endomorph individuals, which corresponds to 16 of the 20 analyzed. The average values of endomorphy in our study were higher than in all karate athletes studies. The averages of ectomorphy in our study were very similar to those found in studies with the same modality. BMI values in our study were higher than all other studies founded. Athletes are close to the upper limit of the overweight range. The body fat percentage values measured by skinfold and BIE technique showed no statistically significant differences. We conclude that seems to be no predominance of ectomorph and endomorph biotype in elite a Karate Fighters. This would be the most common biotype after years of work and training. In our study, we could not identify it, probably due to heterogeneity of sample. The BIE seemed to be a good and quick application method with satisfactory results as accurate as skin folds, however, the use of only one method would not be indicated to determine the anthropometric karate athletes factors.More studies linking time practice and other anthropometric factors are needed to better ideal biotype understanding in karate fighters.

KEYWORDS: karate, Somatotype, Anthropometry

CARACTÉRISTIQUES ANTHROPOMÉTRIQUES ET LA COMPOSITION CORPORELLE CHEZ LES ATHLÈTES DE KARATE

RÉSUMÉ

Le but de cette étude était d'évaluer les mesures anthropométriques et enregistrer le profil de somatotipológico karatékas régionale qui se propose de décrire leur biotype. L'échantillon de cette étude se composait de 20 hommes, sujets athlètes pratiquant le Shotokan Karate âge 27 ± (12,7) ans et à différents niveaux scolaires. Variables anthropométriques ont été mesurés: masse corporelle (kg), hauteur (m), le pourcentage de graisse en envergure épaisseur du pli cutané et d'impédance bioélectrique (BIE). Pour la détermination des composantes de somatotypes (endomorphe, mésomorphe, ectomorphic) et pour une comparaison ultérieure, nous avons utilisé le programme de calcul et d'analyse somatotype© et aussi l'indice de masse corporelle (IMC) Les résultats ont montré qu'il ya une plus grande tendance des individus méso - endomorphe, ce qui correspond à 16 du 20 analysé. Les valeurs moyennes des endomorphie dans notre étude étaient plus élevés que dans tous les karatékas études. Les moyennes des ectomorphy dans notre étude étaient très semblables à ceux trouvés dans les études avec la même modalité. Valeurs de l'IMC dans notre étude étaient plus élevés que ceux qu'on trouve dans toutes les autres études. Athlètes sont proches de la limite supérieure de la plage de surcharge pondérale. Les valeurs de pourcentage de graisse mesurée par l'équation technique du BIE pli cutané et n'ont montré aucune différence statistiquement significative. Nous concluons que il semble y avoir aucune prédominance de biotype ectomorphe et endomorphe dans une prédominance de karatékas élite, ce serait le biotype le plus commun après des années de travail et de formation. La méthode d'évaluation par bioimpédance semblait être une application vraiment bon et rapide avec des résultats satisfaisants aussi précise et aussi avec des plis de peau, cependant, l'utilisation d'une seule méthode ne serait pas indiqué de déterminer les facteurs anthropométriques chez les athlètes de karaté. Les évaluations sont nécessaires pour observer les facteurs les plus complètes de la composition corporelle appliquées dans karatékas.

MOTS-CLÉS: Karaté, somatotype, Anthropométrie

CARACTERÍSTICAS ANTROPOMÉTRICAS Y COMPOSICIÓN CORPORAL EN ATLETAS QUE PRACTICAN KARATE

RESUMEN

El objetivo de este estudio fue evaluar las mediciones antropométricas y registrar el perfil somatotipológico en karatekas regional con la intención de describir su biotipo. La muestra para este estudio consistió en 20 sujetos varones atletas, practicantes de Karate Shotokan con edad 27 ± (12,7) años y en diferentes grados. Las variables antropométricas se midieron: masa corporal (kg), altura (m), porcentaje de grasa, envergadura, espesor del pliegue cutáneo y la impedancia bioeléctrica (BIE). Para la determinación de los componentes de somatotipos (endomorfo, mesomorfo, ectomorfico) y para su posterior comparación, se utilizó el programa de cálculo y análisis Somatotype© y también el índice de masa corporal (IMC) Los resultados mostraron que hay una tendencia mayor para los individuos meso - endomorfo, que corresponde a 16 de los 20

analizados. Los valores promedio de endomorfia en nuestro estudio fueron más altos que en todos los karatekas de otros estudios. Los promedios de ectomorfia en nuestro estudio fueron muy similares a los encontrados en estudios con la misma modalidad. Los valores de IMC en nuestro estudio fueron más altos que las que se encuentran en todos los otros estudios. Los atletas están cerca del límite superior del rango de sobrepeso. Los valores de porcentaje de grasa medido por la ecuación del pliegue cutáneo y técnica de BIE no mostraron diferencias estadísticamente significativas. Llegamos a la conclusión de que no parece que haya predominio de biotipo endomorfo y ectomorfo en un predominio de karatekas de élite, este sería el biotipo más común después de años de trabajo y formación. El método de evaluación por bioimpedancia parecía ser una aplicación muy buena y rápida con resultados satisfactorios con la mayor precisión y, como en pliegues de la piel, sin embargo, el uso de un solo método no estaría indicada para determinar los factores antropométricos en los atletas de karate. Las evaluaciones son necesarias para observar los factores corporales más completos composición aplicada en los atletas de karate.

PALABRAS CLAVE: karate, somatotipo, la antropometría

CARACTERÍSTICAS ANTROPOMÉTRICAS E DE COMPOSIÇÃO CORPORAL EM ATLETAS PRATICANTES DE CARATÊ

RESUMO

O objetivo desse estudo foi de avaliar as medidas antropométricas e registrar o perfil somatotipológico de caratecas regionais na intenção de descrever o seu biótipo. A amostra deste estudo foi constituída de 20 sujeitos do sexo masculino, atletas praticantes de Caratê Shotokan com idades de 27 ± (12,7) anos e em diferentes níveis de graduação. Foram mensuradas as variáveis antropométricas: Massa corporal (kg), estatura(m), envergadura percentual de gordura através de dobras cutâneas e de bioimpedância elétrica (BIE). Para a determinação dos componentes do somatotipo (endomorfia, mesomorfia, ectomorfia) e para a posterior comparação, foi utilizado o programa somatotype calculation and analysis© e também o Índice de massa corporal (IMC) Os resultados mostraram existir uma maior tendência de indivíduos meso – endomorfo, que corresponde a 16 dos 20 avaliados. Os valores médios de endomorfia no nosso estudo apresentaram-se maiores que todos os estudos em caratecas. As medias de ectomorfia no nosso estudo apresentaram valores semelhantes com os encontrados em estudos com a mesma modalidade. Os valores de IMC do nosso estudo foram mais altos que os encontrados em todos os outros estudos. Os atletas estão próximos ao limite máximo da faixa de sobrepeso. Os valores de percentual de gordura medidos através da técnica de dobras cutâneas equação e BIE não mostraram diferenças estatisticamente significativas. Concluímos que parece haver uma ausência de predomínio do biótipo ectomorfo e um predomínio de endomorfo nos caratecas de elite, esse biótipo seria o mais comum após anos de atividade e treinos. O método de avaliação através da bioimpedância pareceu ser um dado satisfatório e de rápida aplicação com resultados tão preciso e satisfatórios quanto com as dobras cutâneas, Porém, a utilização de apenas um método não seria indicada para determinar os fatores antropométricos em atletas de caratê. Fazem-se necessárias avaliações mais completas para observar os fatores de composição corporal aplicadas em atletas de caratê.

PALAVRAS-CHAVE: Caratê, Somatotipo, Antropometria