# 30 - BODY COMPOSITION AND SOMATOTYPIC PROFILE OF ROWERS FROM MARINE CORPS AND MEMBERS TO BRAZILIAN ROWING CONFEDERATION

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## INTRODUCTION

Rowing was considered an Olympic sport only in the beginning of the twenty century. Before this, along many years it was utilized as a war weapon and as an important allied in commerce. History reveals that some regattas happened before the second half of the nineteen century, and it was also considered one of the most favorite sports among economically high population (CBR, 2002).

Nowadays, rowing is characterized as a sportive modality consisted of cyclic movements, in which both lower and upper limbs work synchronically. Physical exercise intensity and duration vary depending on the training phase. Thereby, low intensity/ long duration and high intensity/ short duration trainings can be observed (SANTINONE & SOARES, 2003).

In rowing as in other sportive modalities, to the optimization of athlete's performance it is necessary to perform a trustworthy evaluation of body compositionone of the most important components in the prescription of a complete program of physical fitness (MCARDLE, KACTH & KACTH, 2001). It is important because a variation in the athlete's body composition influences his performance and it is directly related with inherited characteristics as well as training program and diet (SANTINONE & SOARES, 2003).

The characterization of athlete's somatotypic profile is other component which has been efficiently used by many researchers in order to describe human body composition and shape in a quantitative way (GROSSO et al., 2007).

According to Secher (1983), researches with elite rowers showed important aerobic and anaerobic capacities and high levels of muscular force, involving a combination of force and endurance, mainly in the training period.

Thereby, to evaluate the body characteristics and morphology of rowers will allow the knowing of individual characteristics as well as group characteristics, which in a organized set of procedures, will made him more capable to training and, consequently, to competitions.

In March 2006, a group of recruits from Marine Corps were affiliated to Brazilian Rowing Confederation, in which they did daily training, seeking to make a team of rower athletes focusing competition. The present study aimed to describe the body composition and the somatotypic features of rower athletes belonging to Marine Corps and affiliate to Brazilian Rowing Confederation.

## SUBJECTS AND METHODS

A cross-sectional, descriptive, and quantitative study was performed with 11 male athletes, aged from 20 to 24 years that belonged to Marine Corps and were affiliated to Brazilian Rowing Confederation, in November 2006. Athletes were evaluated in the Laboratory of Anthropometric Evaluation and Dietotherapy from UNISUAM, eight months after the start drills specific to the category of rowing.

At the period of anthropometric measures acquisition the athletes were in the period of training, training three times a week at afternoon, totalizing 2 hours of training. However, training was intercalated with muscular activity in the remaining days of the week, totalizing 1h30min/day. The training was not realized at weekends.

The following variables were analyzed: total body mass (Kg), seven skinfolds [tricipital (TricSF), subscapular (SubscSF), chest (ChesSF), suprailiac (SupraiSF), abdominal (AbdomSF), medial thigh (ThighSF), and medial calf (CalfSF)], three muscle girths [tensed arm (TensArmMG), calf (CalfMG), and abdominal (AbdomMG)], and three bone breadths [biepicondylar humerus (BieHumBB), biestiloidal (BiestBB), and biepicondylar femoral (BieFemBB)].

Total body mass (TBM) and height (H) were obtained at apnea by taking a full breath; skinfolds and girths were analyzed in the right side of the body, in orthostatic position with the musculature relaxed, in triplicate, and the mean value was recorded. Body measures were assessed in accord with the protocol of the International Society for the Advancement of Kineanthropometry (ISAK, 2000).

To assess TBM and H it was used an electronic balance (Filizola) with capacity of 150 kg and resolution of 100g, coupled to a stadiometer (altimeter of 2.00 m). Skinfold thickness was measured with a Sanny Scientific Skinfold caliper with accuracy of 0.1 mm. Muscle girth was measure with an inextensible Sanny Anthropometric Tape with accuracy of 1 mm.

Body fat percentage was calculated as the sum of 3 skinfolds, using the formula proposed by Jackson & Polock (FERNANDES FILHO, 2003).

The somatotype was calculated by the method proposed by Heath and Carter (1980) and cited by Fernandes Filho (2003).

Data were typed and consolidated in the software Excel for Windows 2007. Data analysis were initially performed seeking to describe the studied group, through absolute and relative frequencies and measures of central tendency and dispersion (mean±SD) of the selected variables, using the statistical software SPSS version 10.0.

To participate in the present study, an authorization by informed consent made by the athletes was requested. This work was elaborated in accord with the norms of 196/96 resolution from National Health Council which describes the "Guidelines and regulatory standards of research involving human beings (MS/Fiocruz, 1998)".

## RESULTS AND DISCUSSION

In table 1 are shown the mean, the standard deviation and the minimum and maximum values of skinfolds and girths selected from rowers from Marine Corps and members to Brazilian Rowing Confederation

**Table 1.** Mean, standard deviation, median, and minimum and maximum values for age,total body mass (TBM), height, skinfolds and girths of rowers from Marine Corps and affiliated to Brazilian Rowing Confederation. Nov, 2006.

| Variables | Mean±SD | Median | Minimum | Maximum |
|---|---|---|---|---|
| Age (years) | 21.72±1.27 | 22 | 20 | 24 |
| TBM (Kg) | 81.74±7.50 | 78.8 | 74.2 | 94.3 |
| Height (cm) | 186.91±4.30 | 185.0 | 180.0 | 196.0 |
| ChesSF (mm) | 6.22±2.35 | 5.9 | 4.1 | 11.9 |
| TricSF (mm) | 8.62±3.07 | 7.9 | 4.6 | 13.1 |
| SubscSF (mm) | 10.92±2.59 | 11.1 | 6.4 | 15.6 |
| SupraiSF (mm) | 6.65±2.31 | 6.5 | 4.3 | 12.2 |
| AbdomSF (mm) | 13.49±3.91 | 14.1 | 8.2 | 21.4 |
| ThighSF (mm) | 12.18±4.8 | 12.4 | 5.8 | 20.5 |
| CalfSF (mm) | 8.3±2.06 | 8.5 | 5.4 | 11.8 |
| BiepFemBB (cm) | 9.24±0.34 | 9.2 | 8.8 | 9.8 |
| BiepHumBB (cm) | 7.18±0.36 | 7.1 | 6.5 | 7.8 |
| BiestBB (cm) | 6.13±1.04 | 5.9 | 5.5 | 9.2 |
| TensArmMG (cm) | 33.27±1.74 | 33 | 30.5 | 35.5 |
| AbdomMG (cm) | 81.45±4.82 | 80 | 75.5 | 90 |
| CalfMG (cm) | 37.05±2.02 | 37 | 33.5 | 41 |

Mean age was 21.73 years showing a homogeneous sample. Both variables body mass and height showed heterogeneous mean values (81.74±7.5Kg and 186.91±4.30m, respectively). As the skinfolds and muscle girth, the group also showed mean±SD values heterogeneous. Not happening the same with the mean±SD diameters of bone, this showed homogeneity in the study group (table 1).

The mean total body mass found in the present study was lower than it found by Silva et al. (1984) and Silveira-Júnior *et al*. (1996) in national rowing teams (88.8±11.13Kg and; 92.5Kg, respectively), and higher than it found by Meirelles et al. (1994) in high level teams, 72.2±2.1Kg, as cited by Marins & Giannichi (2003). Mean height (186.8 cm) was similar to values found by Silveira-Júnior *et al*. (1996).

According to Seiler (1998) as cited by Vinci (2000), elite competitive rowers from heavyweight category are both taller and stronger when compared to endurance athletes. For instance, the characteristics of the team of olympic rowers from United States in 1992 were: mean weight, 88.1 Kg; mean height, 194.1 cm and; fat percentage, 8.7%.

Variables shown in table 2 have heterogeneous distribution, with the exception of body density, which had homogeneous distribution (1.06 to 1.088).

**Table 2.** Mean, standard deviation, median, and minimum and maximum values for fat percentage, fat mass, lean mass, bone mass, residual mass, muscular mass, skinfolds, body density, endomorphy, mesomorphy and ectomorphy (somatotype) of rowers from Marine Corps and affiliated to Brazilian Rowing Confederation. Nov, 2006.

| Variables | Mean±SD | Median | Minimum | Maximum |
|---|---|---|---|---|
| Fat percentage (%) | 10.21±3.87 | 10.16 | 4.98 | 17.12 |
| Fat mass (Kg) | 8.58±3.98 | 7.86 | 3.74 | 15.65 |
| Lean mass (Kg) | 73.15±4.05 | 71.94 | 68.07 | 80.89 |
| Bone mass (Kg) | 13.16±1.79 | 12.51 | 11.31 | 17.94 |
| Residual mass (Kg) | 19.7±1.79 | 19 | 17.9 | 22.7 |
| Muscular mass (Kg) | 40.29±2.48 | 40.6 | 35.78 | 44.17 |
| Skinfolds (mm) | 66.42±18.42 | 64.2 | 44.4 | 101.2 |
| Body density (mm) | 1.08±0.01 | 1.08 | 1.06 | 1.088 |
| Endomorphy | 2.30±0.68 | 2.11 | 1.37 | 3.65 |
| Mesomorphy | 3.65±0.58 | 3.71 | 2.55 | 4.87 |
| Ectomorphy | 2.98±0.66 | 3.01 | 1.48 | 3.82 |

The mean fat percentage (10.21±3.87) found in the present study (fig. 1) was similar that found by Meirelles et al. (1994) as cited by Marins & Giannichi (2003) in high level teams (9.8±0.8). However, this study based its evaluation on Faulkner protocol which utilizes four skinfolds.

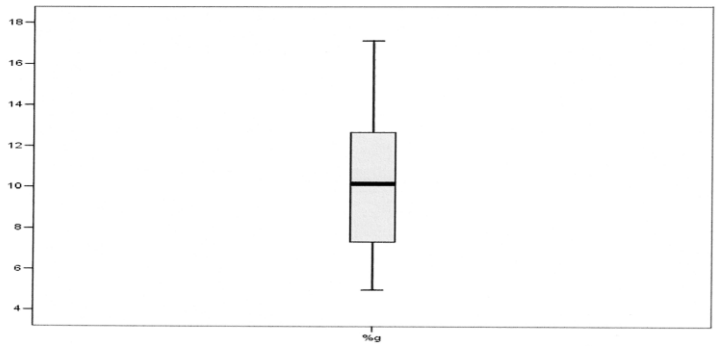


**Figura 1.** Valor médio do % de gordura de remadores do corpo de fuzileiros navais filiados a Confederação Brasileira de Remo.

Rowing is a sport in which the value of relative subcutaneous fat recommended is between 10 and 15%. This is

because it demands an endurance and/or aerobic training over skeletal muscle since it is an activity of resistance which involves major muscle groups, thus requiring an increase in both glycogen and triglycerides storage in order to guarantee a higher energy storage (MCARDLE, KACTH & KATCH, 2001).

The somatotype according to the method proposed by Heath-Carter, which allows study more accurately the ideal physical type in accord with the sportive modality, is an adequate tool to discover talents. It also allows the continuous monitoring of body composition along the planning of the exercise (MARINS & GIANNICHI, 2003).

The following somatotypic values from the athletes evaluated were obtained in the present study (mean±SD): mesomorphy, 3.65±0.58; endomorphy, 2.30±0.68 and; ectomorphy, 2.98±0.66 (table 2). According to the somatochart proposed by Heath-Carter, the classification of the athletes was mesoectomorph (fig. 2); i.e., the individuals showed high lean mass (obtaining better indexes in force and potency works, which is fundamental in rowing) and stretched body structure (ideal for sports which require equilibrium and flexibility) (BIESEK; ALVES; GUERRA, 2006).

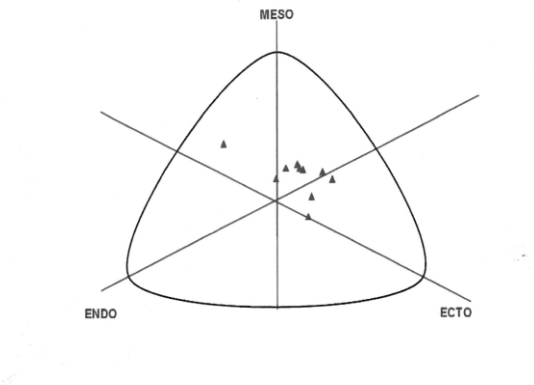


**Figure 2.** Somatochart of rowers from Brazilian Marine Corps and affiliated to Brazilian Rowing Confederation. Nov. 2006.

**CONCLUSION**

Most of evaluated athletes showed the mean body fat percentage within the expected range and showed ectomesomorphic according to the classification of the somatotype.

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**BIBLIOGRAPHY**

BIESEK, S.; ALVES, L.A.; GUERRA, I. *Estratégia de nutrição e suplementação no esporte.* São Paulo: Manole. 2005, 505p.

Confederação Brasileira de Remo (CBR). *Histórico* [Internet]. 2002 [acesso mar. 2007]. Disponível em: http://www.cbr-remo.com.br

FERNANDES FILHO, J. *A prática da avaliação física*. 2. ed. Rio de Janeiro: Shape, 2003. 268p.

International Society of the Advancement of kineanthropometry. Disponível em: http://www.isakonline.com/publications.html - Acessado em: 20/10 de 2006.

GROSSO, F.; MATARUNA, L.; DANTAS, P. FERNANDES FILHO, J. *Perfil somatotípico e composição corporal de atletas de judô brasileiros masculinos cegos e deficientes visuais*. Disponível em: http://www.efdeportes.com/efd106/atletas-de-judo-brasileiros-masculinos-cegos-e-deficientes-visuais.htm Acessado em: 10/09/2007.

MARINS, J. C. B.; & GIANNICHI R. S. *Avaliação e Prescrição de Atividade Física: Guia Prático.* 3ª ed. Rio de Janeiro: Shape, 2003.

MC ARDLE, W. D., KATCH F.I. & KATCH V. *Nutrição para o desporto e o Exercício.* Rio de Janeiro: Guanabara Koogan. 2001.

MS/Fiocruz. Ministério da Saúde. Fundação Oswaldo Cruz. *Diretrizes e normas regulamentadoras de pesquisa envolvendo seres humanos* resolução 196/96 do Conselho Nacional de Saúde. Rio de Janeiro, RJ. 1998.

SECHER NH, VAAGE O. Rowing performance, a mathematical model based on analysis of body dimensions as exemplified by body weight. *Eur J Appl Physiol.* 1983; 52(1):88-93.

SANTINONI, E. & SOARES, E.A. Avaliação nutricional de remadores competitivos. *Rev. Nutr.,* Campinas, 2006. mar./abr. 19(2):203-214.

VINCI, D. Rowing. In: Cristine Rosenbloom, editor**.** *Sports Nutrition: a guide for the Professional working with active people.* Sports, Cardiovascular, and Wellness Dietetic Pratice Group, The American Dietetic Association 3 ed. 2000.

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**BODY COMPOSITION AND SOMATOTYPIC PROFILE OF ROWERS FROM MARINE CORPS AND MEMBERS TO BRAZILIAN ROWING CONFEDERATION**

**ABSTRACT**

Competitive rowing is a sporting modality which demands high energetic expenditure, in which the intensity and duration of physical exercise varies in accord with the training phase. This study aimed to describe body composition and somatotypic features of rowing athletes from marine corps and members to Brazilian Rowing Confederation. A cross-sectional, descriptive, and quantitative study was performed with 11 male athletes, all volunteers, with age between 20 and 24 years,

belonging to marine corps and members to Brazilian Rowing Confederation. The following parameters were analyzed: total body mass (Kg), height (m), nine skinfolds, two muscle girths and three bone breadths. Data analysis was initially performed to describe the studied groups by absolute and relative frequencies, and measures of central tendency and dispersion, using the statistical software SPSS version 10.0. We used the method proposed by somatotype Heath and Carter. Data are shown as mean±SD. The age of the athletes evaluated was 21.72±1.27 years, and the mean body mass and height were 81.74±7.50Kg and 186.91±4.30cm, respectively. The mean body fat percentage was 10.21±3.87. Somatotypic components of the athletes evaluated were: mesomorphy 3.65±0.58; endomorphy 2.30±0.68 and; ectomorphy 2.98±0.66. Most of the athletes have the mean body fat percentage within the expected range, and according to somatotype, their classification was ectomesomorphic.

Key words: Rowing, Body Composition, Somatotype

**LA COMPOSITION CORPORELLE ET SOMATOTYPIC PROFIL DE RAMEURS DE MARINE CORPS ET AFFILIÉS À LA CONFÉDÉRATION BRÉSILIENNE AVIRON**

**RESUMÉ**

Le concours d'aviron est un sport qui exige une grande dépense d'énergie, où l'intensité et la durée de l'exercice varient selon le stade de l'entrainement. Objectif: Décrire la composition corporelle et les caractéristiques somatiques d'atletes de l'aviron du corps des Marines et affiliés à la Confédération brésilienne d'Aviron. Méthodes: Un étude descriptif, quantitatif, transversale, a eu lieu avec 11 athlètes masculins, bénévoles, avec des âges allant de 20 à 24 ans, membres du corps des Marines et affiliés à la Confédération brésilienne d'Aviron. Les variables suivantes ont été mesurées par individu: le poids corporel total (kg), hauteur (m), neuf plis cutanés, deux périmètres musculaires et trois diamètres osseuses. L'exploitation des données a été faite, dans un premier temps, afin de décrire le groupe étudié, de l'absolu et par rapport à la fréquence, des mesures de tendance centrale et de dispersion, des variables choisies, en utilisant le logiciel de statistiques SPSS 10,0. Nous avons utilisé la méthode de Heath et Carter somatotype. Résultats: La moyenne d'âge des athlètes a été évaluée en 21,72 ± 1,27 ans, la moyenne de masse corporelle et la taille ont été 81,74 ± 7,50 kg et 186,91 ± 4,30 m, respectivement. Le pourcentage moyen de matière grasse a été 10,21 ± 3,87. Les valeurs suivantes de moyenne ± écart-type des éléments des athlètes somatotípiques évalués: mesomorphy: 3,65 ± 0,58; endomorphy: 2,30 ± 0,68; ectomorphy: 2,98 ± 0,66. La grande majorité des athlètes ont le pourcentage moyen de la masse grasse corporelle dans les limites et, selon le somatotype, la classification a été ecto-mesomorfo.

Mots-Clés: Aviron, Composition Corporelle, Somatotype

**COMPOSICIÓN CORPORAL Y PERFIL SOMATOTÍPICO DE REMADORES DE LA INFANTERÍA DE MARINA Y AFILIADOS A LA CONFEDERACIÓN BRASILEÑA DE REMO**

**RESUMEN**

La competencia de remo es un deporte que exige gran gasto energético, donde la intensidad y la duración de ejercicio varían de acuerdo com la etapa de entrenamiento. Objetivo: describir la composición corporal y las características somatotípicas del los atletas de la infantería de marina y afiliados de la COnfederacíon Brasileã de Remo. Método: Un estudio destrictivo, cuantitativo, de sección transversal, se llevó a cabo con 11 atletas varones, voluntarios, de edades compreendidas entre los 20 a 24 años, miembros del cuerpo de marines y afiliados de la confederación brasileña del remo. Las siguientes variables fueron evaluadas por persona:el total de masa corporal total (kg), la estatura (m), nueve pliegles cutáneos, dos perímetros musculares y tres diámetros de los huesos. La exploración de los dados se hizo, inicialmente, teniendo en vista describir el grupo estudiado, desde la absoluta y relativa frecuencia, las medidas de tendencia central y disperción, de las variables seleccionadas, utilizando el paquete estadístico SPSS 10.0. Se utilizó el método somatotipo de Heath y Carter. Resultados: La media de edad de los atletas evaluados fue de 21,72±1,27 años, com uma media de masa corporal y la estatura de 81,74±7,50Kg y 186,91±4,30m, respectivamente. El promedio de procentaje de grasa fue 10,21±3,87. Se obtuvieron los siguientes valores promedios±SD de los componentes somatotípicos de los atletas evaluados: mesomorfia, 3,65±0,58; endomorfia, 2,30±0,68; ectomorfia, 2,98±0,66. La gran mayoría de los atletas tuvieron la media de porcentaje de grasa corporal dentro de los límites previstos y, en segundo lugar somatotipo, la clasificación se ecto-mesomorphic.

Palabras Clave: Remo, Composición Corporal, Somatotipo

**COMPOSIÇÃO CORPORAL E PERFIL SOMATOTÍPICO DE REMADORES DO CORPO DE FUZILEIROS NAVAIS E FILIADOS À CONFEDERAÇÃO BRASILEIRA DE REMO**

**RESUMO**

O remo competitivo é uma modalidade esportiva que demanda grande gasto energético, onde a intensidade e a duração do exercício físico variam de acordo com a fase de treinamento. Objetivos: descrever a composição corporal e as características somatotípicas de atletas de remo do corpo de fuzileiros navais e filiados a Confederação Brasileira de Remo. Métodos: realizou-se um estudo descritivo, quantitativo, de corte transversal, com 11 atletas homens, voluntários, com idade entre 20 e 24 anos, integrantes do corpo de fuzileiros navais e filiados a Confederação Brasileira de Remo. Foram aferidas as seguintes variáveis por indivíduo: massa corporal total (Kg), estatura (m), nove dobras cutâneas, dois perímetros musculares e três diâmetros ósseos. A exploração dos dados foi feita, a partir da freqüência absoluta e relativa do grupo estudado, pelas medidas de tendência central e dispersão, das variáveis selecionadas, utilizando-se o pacote estatístico SPSS 10.0. Utilizou-se o método somatotipo proposto por Heath e Carter. Resultados: a média de idade dos atletas avaliados foi de 21,72±1,27 anos, as médias de massa corporal e a estatura foram 81,74±7,50Kg e 186,91±4,30m, respectivamente. O percentual médio de gordura foi de 10,21±3,87. Obtiveram-se os seguintes valores médios±dp dos componentes somatotípicos dos atletas avaliados: mesomorfia: 3,65±0,58; endomorfia: 2,30±0,68; ectomorfia: 2,98±0,66. Conclusão: a grande maioria dos atletas apresentou o percentual médio de gordura corporal dentro do limite esperado e, segundo o somatotipo, a classificação foi ecto-mesomorfo.

Palavras Chave: Remo, Composição Corporal, Somatotipo.