61 - OVERALL AEROBIC FITNESS AND BODY MASS INDEX IN THE ELDERLY PRACTICING AQUATIC ACTIVITIES

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INTRODUCTION

The population aging is a worldwide phenomenon and has happening in the developing countries in a short space of time. Besides, another relevant factor is related to the daily life activities in the current society, technologically developed. The physical work is insufficient to stimulate the cardiorespiratory and muscular systems, emerging the necessity of doing physical exercise regularly for the maintenance of the functional capacity.

The study of Jackson et al. (1995) demonstrated that aerobic capacity, evaluated by means of the oxygen consumption during the maximum effort (VO2max), declines with the aging due to cardiac and mainly peripheral factors, however this reduction can be modified by the physical training.

In addiction, according to Raso (2002), the natural process of aging is also characterized by the increment of the body fat content. The Pan-American Health Organization - OPAS (2006) showed the raised prevalence of obesity in the population, mainly in the elderly. The weight excess increases the risk of morbidity and mortality, being one of the predisposing factors to the functional incapacity in the elderly (RASO, 2002).

The hydro gymnastics and swimming are among the modalities of exercises that aim at training the aerobic capacity. In accordance with Alves et al. (2004), the aquatic activities provide some advantages for the elderly: the utilization of the physical properties of the water makes possible to have a greater progress, beyond offering less physical risks. The authors also verified that hydro gymnastics contributes to the improvement of the physical fitness related to the health, mainly in relation to the overall aerobic fitness (OAF), where was verified an increase of 10% and 40% in the aerobic power.

Pitta et al. (2003) studied the relation between the aerobic fitness (OAF) and the Body Mass Index (BMI), and found higher values of BMI associated with lower levels of OAF. In accordance with such studies, the OAF is fundamental for the accomplishment of the daily life activities and can be influenced by the BMI.

Finally, is very important to monitor the parameters of the OAF and of the BMI of the elderly practicing these types of exercises, especially in order to quantify their evolution and to guarantee a favorable prognostic to the improvement of the physical fitness related to their health.

In face of this, the main objective of this study was to evaluate the overall aerobic fitness and the body mass index of the elderly practicing aquatic activities.

MATERIAL AND METHODS

This research was approved by the Ethics Committee of the University of the Santa Catarina State (UDESC) in 29/03/2005, process number 163/2005.

This is a descriptive field study. The population was composed by 100 (one hundred) elderly participants in project of hydro gymnastics and swimming of the Studies Group of the Third Age (GETI) of the UDESC. The sampling process was casual and unsystematic. The sample was composed by 52 (fifty two) elderly women, being 40 practicing hydro gymnastics and 12 practicing swimming. The predominant age range was between 65 and 70 years (32,7%), followed by the age range of 70 to 74 years old (28,8%). The mean age was 68,62 years (sd = 4,98). The reason of this study to be exclusively with a female sample is the fact that the normative values of the overall functional fitness, evaluated by means of the tests battery of the AAHPERD developed by Zago and Gobbi (2003) and Hoefelmann et al. (2006) and used on this research, was based on data only gotten from women.

The instruments of this study were: the test of walking half mile for evaluation of the overall aerobic fitness (OAF), and the anthropometrics measures of weight (body mass) and height to evaluate the body mass index (BMI). The OAF test is part of the tests battery for the elderly of the American Alliance for Health, Physical Education, Recreation and Dance - AAHPERD (OSNESS et al., 1990). It was carried through in a running track 200 meters, being the results written down in minutes and seconds. For the determination of the body mass, the digital weighing scale TANITA - ULTIMATE SCALE -, model 2001W-B, Max.300 lb (136 kg) (21 st-6 lb) TOLEDO, model 2096 PP (precision of 0,1 kilograms) was used, and to verify the height was used one stadiometer WCS 217cm with platform, CARDIOMED mark, which met itself fixed to the wall.

The data had been collected by previously trained students of the CEFID/UDESC. It was realized a personal contact with the elderly of the GETI/UDESC program, when the objective of this research was explained and they were requested to take part in the study. After that, it was set the appointments of date, schedule and place, for the fulfillment of OAF test and the measure of weight and height.

In the data collection date, the tests protocol was explained for the elderly. The ones who had agreed to take part in the research had signed the informed consent in two ways, being one copy for each research subject and the other for the GETI. The tests had been applied in November 2005 in the running track of the CEFID/UDESC in the elderly practicing swimming and hydro gymnastics during a minimum period of six months in the GETI projects.

The OAF test data were compared with the normative values for the AAHPERD battery, elaborated by Zago and Gobbi (2003) for women with age between 60 and 70 years, and by Hoefelmann et al. (2006) for women with age between 71 and 80 years. The classification was in five levels, as it is shown in table 1:

Table 1 - Classification of the motor test of overall aerobic fitness (OAF)

Sum of the points score-percentile	OAF Category	Age range 60 - 70 years	Age range 71 - 80 anos
0-19	Very Weak	> 546	> 601
20-39	Weak	547 - 509	600 - 546
40-59	Regular	508 - 491	545 - 525
60-79	Good	490 - 463	524 - 505
80-100	Very Good	< 462	< 504

Source: Zago e Gobbi (2003); Hoefelmann et al. (2006).

The values of the Body Mass Index (BMI) were classified into four categories, listed in table 2.

Table 2 - Classification of BMI for adults, proposed by WHO.

Classification	BMI (Kg/m^2)
Low weight	< 20
Normal	20 - 24,9
Overweight	25 - 29,9
Obesity	> 30

Source: WHO (1990).

Considering that the elderly women of this research had showed values of BMI higher than 20 Kg/m^2, the classification was given in three levels: normal, overweight and obesity.

The dada were organized in the excel program and analyzed with aid of the statistical software SPSS 13.0 for Windows. The statistical analysis of the present study, done by means of the test of Kruskal-Wallis, with a significance level of $p<0,05$.

RESULTS

In table 3, it is displayed the descriptive results concerning the characteristics of the sample in relation to the practice of aquatic activities and the age range.

Table 3 - Frequency (n) and percentage (%) of the aquatic activities practice and age range of the elderly women.

Results		(n) 52	(%) 100,0
Aquatic Activities	Hydro Gymnastics	40	76,9
	Swimming	12	23,1
Age Range	60 to 64 years	12	23,1
	65 to 69 years	17	32,7
	70 to 74 years	15	28,8
	75 to 79 years	8	15,4

In table 4 it is shown the descriptive results of the sample data regarding the scores of overall aerobic fitness, BMI and the statistical test values.

Table 4 - Frequency (n) and percentage (%), median (md), inter-quartile interval (IQ) and the Kruskal-Wallis test between the overall aerobic fitness (OAF) and the body mass index (BMI) of elderly women.

Results		(n) 52	(%) 100,0	md	IQ	valor	p
OAF	Very Good	11	21,2	4,0	2,0-5,0	19,18	0,001*
	Good	3	5,8				
	Regular	9	17,3				
	Weak	15	28,8				
	Very Weak	14	26,9				
BMI	Normal	7	13,5	2,0	2,0-3,0		
	Overweight	28	53,8				
	Obesity	17	32,7				

* $p<0,05$

DISCUSSION

It can be observed, in table 3, that the predominant age range was 65 to 69 years old (32,7%), followed by the age range of 70 to 74 years old (28,8%). The mean age was 68,62 years (sd = 4,98). In the majority of the studies, the adherence to the exercise programs and tests happens for younger elderly, as example: Hernandes and Barros (2004) with a sample of 20 elderly, the age average was 67,7 years; in the Matsudo et al. (2002) research, the average was 65 years; as happened in several other studies as Madureira and Lima (1998), Melo and Giavoni (2004), Rabelo et al. (2004), that had an mean age below 68 years in their samples. The elderly is not in the labor market nowadays and normally has a good health, what makes easy his insertion into physical activities and elderly groups. The organic decrease is accentuated from 70 years of age, complicating the already existent chronic illnesses, what compels the elderly to give up these groups. This is one of the reasons that explains the low percentage (15.4%) of elderly with age above 75 years participating in this research.

In relation to the aerobic fitness or OAF results, more than half of the participants (55.7%) had low OAF scores: 28.8% had been classified as "weak"; 26.9% as "very weak"; 27% had better OAF scores: "good" (5.8%) and "very good" (21.2%); only 17.3% of the sample were classified as "regular". Madureira and Lima (1998) affirm that aquatic activities improve the cardiorespiratory conditioning. It can be observed that the OAF scores found in this sample represent inferior values to those assumed for a population that already exercises for at least six months, although 21.2% were classified as having a very good OAF. It should be remembered that the normative values used for the classification were created based on the Brazilians elderly participants of physical activities groups.

In other studies, as Alves et al. (2004) and Madureira and Lima (1998), it was found satisfactory results with only three and four months of regular physical exercise, respectively.

Wood et al. (2001) also observed improvements in the cardiovascular fitness and performance of exercises, as well as additional effects in the optimization of the functional fitness components of elderly with age between 60 and 84 years, with only 12 weeks of physical exercises.

Mian et al. (2006) found benefits in the functional fitness with a physical conditioning program of 12 months in healthy elderly; Sanders and Maloney-Hills (1998) with 16 weeks of aquatic activities; and Rabelo et al. (2004) with 13 weeks of swimming.

In the face of our results, Matsudo et al. (2000) defend that the effect of the aging in the physical fitness happens in the reduction of the aerobic power around 1% to the year; however in active individuals these losses are smaller. This would explain

so different values of OAF in the same group and suggests that these values could be smaller if the elderly has not practiced any kind of regular physical exercise.

Another issue to be questioned would be the physical activity level before the beginning of the program. Jackson et al. (1995) affirm that if the physical activity level and the body composition were keep constant, throughout the time, the assumed VO_2max decline tax would be 0,25ml/kg ? ¹ .min ? ¹ per year. This way, the aging itself would not cause functional incapacity since the individual keep himself physically active and with suitable level of body composition. The study of Villar et al. (2001) comes to corroborate with such evidence. They evaluated the effects of one year of generalized physical activity with moderate intensity on the levels of OAF in 16 physically active and apparently healthy elderly individuals of both genders. The authors had concluded that this type of activity prevents from OAF decline caused by aging and/or factors associated to it. However, Kohrt et al. (1991) studied 110 healthy and sedentary elderly subjects (60-71 years) for, at least, two years and verified that the adaptations of the VO_2max to the exercise were independent of the physical activity level.

On the other hand, Zago and Gobbi (2003) say that when sedentary elderly subjects start to frequent physical activity programs, there is a significant improvement in the aerobic capacity, as much for men as for women; such thing let us to consider that the pre-exercise OAF levels were lower than the current ones, and that the exercise would have brought improvement in this variable, even so not the ideal one.

In the referring BMI results, high indices, above normality, were evidenced (53.8% with overweight and 32.7% with obesity, totalizing 86.5% of the sample with high values of BMI). These data are preoccupying, and indicate that only 13.5% are inside the BMI values considered as normal.

Matsudo et al. (2002), studying 117 women with age range between 50 and 79 years that practice physical exercise regularly for a period from 2 to 8 years, verified values of BMI above normality. Similar data were found by Alves et al. (2004), Hernandes and Barros (2004) and Evenness (2002).

According to Matsudo et al. (2000), with the passage of the years occur changes in the weight and height; however the BMI modifies itself arriving at its maximum value between 45 and 49 years for the men and between 60 and 70 years for the women. After this age, a light decline is followed.

Landi et al. (1999) studied 214 hospitalized patients with average age of 81,2 years (sd 7,3) by means of a longitudinal study, with the objective to verify the relation between the BMI and mortality. The authors verified that a bad nutrition state (BMI<22Kg/m ²) was significantly correlated to the dependence on the daily life activities. However, higher indices of BMI (BMI>27Kg/m ²) were not significantly associated to higher mortality risk among the elderly. Thus, the study concluded that the BMI is an important predictor of the mortality and of the functional dependence of the elderly, being that a low BMI seems to be more harmful than the overweight in this age range.

Stevens et al. (1998) had verified that the relative death risk associated with greater BMI decreases with age, being higher in the age range of 30-44 years and lower between 65-74 years. However, Zamboni et al. (1999) had verified that raised BMI constituted one of the main factors of functional incapacity in elderly women.

Considering our sample values of 86,5% of the individuals with BMI above-normal, Madureira and Lima (1998) and Melo and Giavoni (2004), had also not found significant reductions on the total body mass of elderly practicing hydro gymnastics.

These findings let us to consider that, probably, only the physical activity is not enough for reduction of the BMI indices, and that its association with dietary programs could bring efficient results for this variable. This way, the effect of aquatic activities in the OAF would be optimized. Pitta et al. (2003) had studied the relation between BMI and the OAF test performance of elderly women (60,8 years, sd 7,6) who participated in a physical activity program for the third age (PROFIT) and concluded that, in physically active elderly women, higher values of BMI contribute to lower levels of OAF, fact found on the current study.

The statistical analysis of the present study, done by means of the test of Kruskal-Wallis, demonstrated statistically significant differences (p=0,001), demonstrating a relation between the BMI and the OAF levels. That is, greater values of BMI were associated to low values of OAF.

Such results seem to prove the importance of the physical exercises practice, in the case of hydro gymnastic and swimming, for the maintenance and improvement of the physical fitness, especially OAF and BMI in the elderly who practice physical exercises systematically. Thus, it demonstrates that any physical activity, either hydro gymnastics or swimming brings benefits for the cardiorespiratory capacity and for the reduction of the body weight of the elderly.

An issue to be considered would be the incentive to the adoption of a physically more active lifestyle, with the participation in other physical activity programs more times per week

CONCLUSION

The results had shown preoccupying data that point high indices of BMI associated to low scores of OAF in active elderly women practicing aquatic activities (swimming and hydro gymnastics), where higher values of BMI were associated to low values of OAF.

The physical activity allied to dietary programs can aid in the reduction of BMI; thus the effect of aquatic activities in the aerobic fitness would be optimized.

One another issue to be considered, would be the incentive to the adoption of a more physically active lifestyle, with the participation in hydro gymnastics and swimming programs more times a week, and the increment of other modalities of regular physical exercises beyond those already practiced.

In view of the results, it is suggested the accomplishment of experimental research aiming the evaluation of the effect of the aquatic activities on the behavior of the OAF and BMI in the elderly, considering the scarcity of studies with this kind of approach.

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THE GENERAL AEROBIC RESISTANCE AND BODY-MASS INDEX IN THE AGED THAT PRACTICES AQUATIC ACTIVITIES.

ABSTRACT

Introduction: The general aerobic resistance (RAG) is an important capacity for the performance in the functional activities of the aged ones, and can be influenced for the corporal composition. **Objective:** Evaluate the RAG and the body mass index (IMC) in aged that practice hydro gymnastics and swimming. **Methodology:** 52 aged ones with average age of 68,62 (± 4,8) years had been evaluated, participants of the swimming programs (n=12) and hydro gymnastics (n=40) in the Group of Studies of the Third Age (GETI). It had been carried through measured anthropometrics referring to the calculation of the BMI; the RAG was evaluated through the test of walking half mile, that composes the battery of aged tests for of the AAHPERD in a track of atletismo of 200 meters, being the results written down in minutes and seconds. **Results:** In RAG scores, 26.9% had "very weak" scores, 28.8% "weak", 17.3% "regulate", 5.8% "good" and 21.2% "very good". In order to the BMI, 13.5% had been classified as "normal", 53.8% with "overweight" and 32.7% with "obesity".It was found significant difference in the test of Kruskal-Wallis (19,18), between the values of BMI and the levels of RAG, with a significance level of 0,05. **Conclusion:** The results had shown high indices of BMI associates with low scores of RAG in active aged women. These findings take us to consider that only the physical activity was not enough for reduction in the indices of BMI, and that the increment of alimentary programs could bring more efficient results for this variable; thus the effect of the aquatic activities in the aerobic resistance would be optimized.

Keywords: General aerobic resistance; Body mass index; Aquatic activities.

RÉSISTANCE AÉROBIE GÉNÉRALE ET L'INDICE DE MASSE CORPORELLE DES PERSONNES ÂGÉES QUI SONT PRATIQUÉES DE L'ACTIVITÉS AQUATIQUES

RÉSUMÉ

Introduction: La résistance aérobie générale (RAG) est un important capacité pour la performance des activités fonctionnelles des personnes âgées, et peut être influencée par la composition corporelle. **Objectif:** Évaluer la RAG et l'indice de masse corporelle (IMC) des personnes âgées qui pratiquent activités aquatiques et natation. **Méthodologie:** Ont été évaluées 52 personnes âgées avec âge moyen de 68.62 (+ 4.8) ans, participants des programmes de natation (n=12) et gymnastique aquatique (n=40) dans Groupe de Études du Troisième Age - GETI/UDESC. Ont été réalisées des mesures anthropométriques de poids et de la stature; RAG a été évaluée à travers l'essai de marcher demi mille, qui compose la batterie d'essais pour personnes âgées de AAHPERD, dans une voie d'athlétisme de 200 mètres, et les résultats annotés dans des minutes et les secondes. L'analyse statistique de cette étude a été pour le test Kruskal-Wallis, avec un niveau d'importance de p<0,05.

Résultats: dans le RAG, 26,9% ont eu la classification « très faible », 28,8% « faible », 17,3% « réglementer », 5,8% « bon » et 21,2% « très bon ». Concernant l'IMC, 13,5% a été classé « normal », 53,8% avec « poids excessif » et 32,7% avec « obésité ». Il a été trouvée différence statistiquement significative dans lê test de Kruskal-Wallis (19.18), entre les valeurs d'IMC et des niveaux de RAG, avec un niveau d'importance inférieure à 0.05. **Conclusion:** Les résultats indiquent hauts indices IMC associés avec les résultats de RAG dans les femmes âgées actives. L'activité physique alliée à programmes alimentaires peut assister dans la réduction de l'IMC; ainsi les effets des activités aquatiques dans la résistance aérobie seraient optimisés.

Mots-clés: Résistance aérobie générale; Indice de masse corporelle; Personne âgée.

RESISTENCIA AEROBICA GENERAL Y ÍNDICE DE LA MASA CORPORAL EN LOS ANCIONES PRACTICANTES DE LAS ACTIVIDADES ACUÁTICAS

RESUMEN

Introducción: La resistencia aerobica general (RAG) es una capacidad importante para las actividades funcionales de los ancianos, y se puede influenciar por la composición corporal. **Objetivo**: Evaluar el RAG y el índice de la masa corporal (IMC) en ancianos que practican la hidrogimnasia y la natación. **Metodología**: Participaron 52 ancianos con una edad promedio de 68.62 (de + años 4.8), de los programas de la natación (n=12) y hidrogimnasia (n=40) en el grupo de estudios de la tercera edad - GETI de la UDESC. Se realizaron medidas antropométricas del peso y de la estatura; el RAG fue evaluado a través de la prueba de caminar media milla que compone la batería de las pruebas para el anciano del AAHPERD, en una pista del atletismo de 200 metros, siendo los resultados anotados en minutos y segundos. El analisis del estudio se fue por medio de lo teste Kruskal-Vallis, con signification de p<0,05. **Resultados:** En la RAG, 26.9% de los ancianos tenían resultado "muy débil"; 28.8% "débil"; 17.3% "regular"; "buenos" 5.8% y 21.2% "muy buenos". Con el IMC, 13.5% se fueram clasificados como "normales", 53.8% como "preobesos" y 32.7% con "obesidad". Fue encontrada diferencia significativa estadística en la prueba de Kruskal-Wallis (19.18), para los valores de IMC y los niveles del RAG, con un nivel de la significación inferior a los 0.05. **Conclusión:** Los resultados señalan los altos índices de IMC asociados a los bajos de la RAG en mujeres ancianas activas. La actividad física asociada a los programas alimenticios pueden asistir a la reducción del IMC; y el efecto de las actividades acuáticas en la resistencia aerobia sería optimizado.

Palabras chave: Resistencia aerobica general; Índice de la Masa Corporal; Anciano.

RESISTÊNCIA AERÓBIA GERAL E ÍNDICE DE MASSA CORPORAL EM IDOSOS PRATICANTES DE ATIVIDADES AQUÁTICAS.

RESUMO

Introdução: A resistência aeróbia geral (RAG) é uma importante capacidade para o desempenho das atividades funcionais dos idosos, e pode ser influenciada pela composição corporal. **Objetivo:** Avaliar a RAG e o índice de massa corporal (IMC) em idosas que praticam hidroginástica e natação. **Metodologia:** Foram avaliadas 52 idosas com idade média de 68,62 (± 4,8) anos, participantes dos programas de natação (n=12) e hidroginástica (n=40) no Grupo de Estudos da Terceira Idade (GETI). Foram realizadas medidas antropométricas referentes ao cálculo do IMC; a RAG foi avaliada através do teste de andar meia milha, que compõe a bateria de testes para idosos da AAHPERD, numa pista de atletismo de 200 metros, sendo os resultados anotados em minutos e segundos. **Resultados:** Nos escores de RAG, 26,9% tiveram escore "muito fraco", 28,8% "fraco", 17,3% "regular", 5,8% "bom" e 21,2% "muito bom". Em relação ao IMC, 13,5% foram classificados como "normal", 53,8% com "sobrepeso" e 32,7% com "obesidade". Foi encontrada diferença estatisticamente significativa no teste de Kruskal-Wallis (19,18), entre os valores de IMC e os níveis de RAG, com um nível de significância inferior a 0,05. **Conclusão:** Os resultados apontam altos índices de IMC associados a escores baixos de RAG em mulheres idosas ativas. Esses achados nos levam a considerar que somente a atividade física não foi suficiente para redução nos índices de IMC, e que o incremento de programas alimentares poderia trazer resultados mais eficazes para esta variável; assim os efeitos das atividades aquáticas na resistência aeróbia seriam otimizados.

Palavras-chave: Resistência aeróbia geral; Índice de massa corporal; Atividades aquáticas.