19 - EFFECTS OF COMBINED PHYSICAL TRAINING IN RISK OF FALLS IN THE ELDERLY

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INTRODUCTION

Population aging is a worldwide phenomenon that is repeated here in Brazil. According to the Brazilian Institute of Geography and Statistics (2008), in the year 2030, Brazil will have the sixth highest number of elderly people above 60 years.

According to Matsudo et al (2004), aging is a continuous process which occurs during the progressive decline of all physiological processes, such as decreased nerve conduction, strength and muscle mass, loss of range of motion, decrease in neural speed loss and in bone mass among others, so that the elderly would also lose functional capacity and independence, impairing their quality of life.

According to Ferreira et al (2005), physiological changes may lead the elderly to have difficulties in walking and balance, increasing the risk of falling and have serious consequences, such as fractures, injuries, anxiety, depression, fear syndrome, among others factors that may worsen their quality of life. Among them, physiological muscle weakness can be highlighted, to cause damage or delay locomotor balance reactions. Thereby, evaluating the march can help infer the risk of falls.

Falls can have intrinsic factors, depending on the individual or extrinsic factors, such as the environment they live in. In relation to the balance, vestibular, visual and somatosensory systems are combined to maintain the upright posture. However, the age-related deterioration affects all those systems, so it is easy to understand the difficulty of achieving the necessary adjustments. Therefore elderly people are most likely to suffer falls, a problem that affects the functional capacity of the elderly, making them dependent on assistance, limiting their autonomy (FABRICIO and Rodrigues, 2006).

Podsiadlo and Richardson (1991) reported that the Time Up and Go test is used to assess the risk of falls, in order to evaluate the mobility and balance, quantifying the performance of mobility through the speed of the elderly in daily tasks. This test is easy to be applied and is renowned for its reliability by the scientific literature.

In this context physical activity has been employed as a strategy to improve the quality of life of the elderly, reducing the effects caused by physiological changes that accompany the advance of age (Varela, 2009).

Therefore, the objective of this study is to test the influence of combined physical training in the risk of falls on elderly people from the extension project of Faculdade Guairacá, verifying whether a 12-week training physical activity led to a decrease in the risk of falls.

METHODOLOGY

This study was characterized as a field research using pre – experimental (THOMAS AND NELSON, 2002), with pre and post-tests on a single study group, with no control group. This research consisted on evaluating the risk of falls of a group of elderly people before and after their participation in a 12-week combined exercise program. The sample consisted of 27 elderly people, 5 men and 22 women, who attend Faculdade Guairacá educational project, located in the city of Guarapuava / PR. There was the inclusion criteria of the study participants, in which they should be 60 years or older and have initiated activities in the education program, in March 2010. The elderly were monitored through a roll call by which to justify a maximum of three consecutive absences due to illness or something understandable, were excluded from the study seniors who had cognitive impairment and diseases which affect balance and gait. All signed an informed consent term.

To assess the risk of falls the Time Up and Go test was used, proposed by Podsiadlo, Richardson (1991) to quantify the performance of mobility through the speed of the elderly to perform the task. The first data collection (pre-test) was performed in March 2010, the second sample (post-test) in June 2010.

Anthropometric measurements, body mass (kg) and height (cm) were obtained according to procedures described by Petroski (2009). Body mass was determined using a Welmy ® brand scale and the for height, a stadiometer fixed on the same scale. The body mass index (BMI) was obtained by the quotient of body weight / height ² and is expressed in kg / m².

For the test Time Up and Go, we used an armless chair with a height of 45 cm, a digital timer from Timex ® brand, adhesive tape, a small orange cone, pens and cards for recording the data.

Before the test started, subjects were informed about how to perform it. After the examiner's voice command, they started. Participants had to get up from his chair without the help of their hands. Then they should walk a distance of 3 meters, return to the chair and sit down, completing this circuit as fast as possible. They completed the circuit twice. The first time was to learn the procedure, and the second time was to obtain the data. They were not allowed to receive any help from someone during the test.

After the test, the groups were divided into three subgroups, according to the time spent to accomplish it: less than 10 seconds: low risk of falls; 10 to 20 seconds: average risk of falls; and over 20 seconds: high risk of falls.

If the elderly took up to 20 seconds to complete the test, they were considered independent in performing their daily tasks. If they took longer than 20 seconds, the elderly presented increased risk of falls and functional dependence.

The training was conducted over a period of 12 weeks. Physical training was developed with machines and free weights (dumbbells, ankle and washers) with aerobic dance and stretching, in circuit form, six exercises for upper limbs (Peck deck / Flying, lateral raise, seated row, triceps and biceps curl pulley) and six for the lower limbs (leg press, leg extension, bench flexor, adductor and abductor chair and calf) and abs. We established a weekly frequency of three non-consecutive days. Loads and intensity were established following the recommendations of the American College of Sports and the American Health Association (2007), totalizing 36 training sessions combined in this study.

RESULTS AND DISCUSSION

From the 27 participants, only 20 completed the study. Three subjects dropped out for no reason, and four participants did not make the post-test on the day scheduled for reassessment. The total number of dropouts was seven subjects,

representing a 26% of sample loss. From the 20 participants, four were men and 16 women. The frequency of the training was 85%.

The mean values, standard deviation, minimum and maximum anthropometric variables of the sample are in the table.

TABLE 1 - Mean values, Standard Deviation, Minimum and Maximum of anthropometric of the elderly.

	Average	*StandardDeviation*	*Minimum*	*Maximum*
Age (years)	64,9	2,9	61	70
Height(m)	1,58	0,08	1,5	1,8
Weight(kg)	75,3	15,0	53	115,0
IBMI (kg/m²)	30,9	3,9	16,6	34,1

Legend: BMI – Body Mass Index

According to Table 1, the average age was 65 years old, height 1.58, weight 75.3 and BMI 30.1, indicating that most seniors are overweight according to BMI elderly classification proposed by WHO (2007).

Table 2 presents the results of the Time Up and Go test, before and after the combined physical training program.

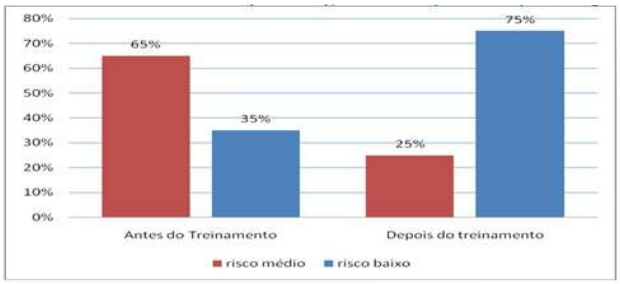
There was a significant decrease in time taken for completion of the test after 12 weeks of training. In the pre-test, elderly completed the circuit in 11.96 s on average, and in the post-test, they took 9.9 s, on average. The time difference between pre and post-test was of 2.06 s, concluding that there was a decrease in the time of testing in 18%.

TABLE 2 - TEST OF TIME AND GO UP AVERAGE VALUES AND STANDARD DEVIATION TIME ACHIEVEMENT.

	Pre-Test 0 (m)	*Pots-Test 3 (m)*	*Value of P*
Average	11,96s	9,9s	0,0001*
StandardDeviation	2,4	2,3	

* Statistically significant difference (p< 0,05).

The chart below shows the changes in the risk of fall, according to the classification of time spent, which considered low risk of falls (0 to 10s), moderate (10 to 20s) and high risk (> 20 s).



PICTURE - REPRESENTATION AS PERCENTAGE OF INDIVIDUALS WITH RISK OF FALLS BEFORE AND AFTER TRAINING COMBINED.

The results obtained in the pre-test showed that 35% of subjects were classified as low risk of falls and 65% at average risk, no individual has done the test time exceed 20s, so no individual was classified at high risk of falls.

After the combined training program of 12 weeks, the results presented in the post-test show that 25% of the subjects continued in the average risk of falls and that 75% were classified as having low risk of falls, there was a migration of 40% of individuals of average risk to low risk after the training program, showing that the combined training may have influenced to a significant improvement and decreased risk of falls.

Pereira et al (2008) and Averin (2004) performed strength training programs, walking and stretching during the period of 12 weeks, and the results showed significant improvement in standards of postural balance, coordination, agility and strength, showing similar results to the present study. Another author, Silva et al (2008), conducted a similar study, and found positive results in relation to balance, proving that combined exercise work on the improvement of various components of physical fitness, such as the balance.

These results corroboprate with Perchs (2008), whose study on the effect of physical training on the parameters of the motion also showed that there was an improvement in range of several joints, increased muscle force-generating capacity, increase in forward speed, variables representing important indicators of mobility and balance, thus reducing the risk of falls in participants.

A recent study by Braga (2010) found the effect of a 12-week combined training with stretching, resisted work, balance and coordination. The sample consisted of 28 women who underwent physical training and a control group. To assess the mobility the Time Up and Go Test was used and the functional balance was assessed with a Berg scale. The results meet the present results, showing improved power, muscle strength, and acceleration time, and reduction of time TUG test.

In another study by Silva et al (2007) by submitting a group of elderly people to physical exercise, it was possible to find that a progressive strength training influence the variables of balance, coordination and agility, the results show an improvement in the variables studied, improving their functional capabilities and minimizing the risk factors for falls.

Information considered in Resende, Rassi and Viana (2008) discuss their research on the effects of hydrotherapy in balance recovery and prevention of falls in elderly women in a program of 12 weeks of combined training and found significant results, demonstrating that there were improvements in balance and strength in the elderly, thus decreasing the risk of falls, suggesting the present work along with training programs that can be performed in water, reaching their goals of improved strength and balance.

Silva et al (2008) discusses that, with increasing age and life expectancy, preventive actions are necessary in order to help control risk factors for falls and measures to promote the participation of the elderly in programs of practical activities physical, which has been used as a therapeutic tool, in order to assist in the improvement of physical mobility and postural stability variables that are directly related to balance and decrease falls.

These results confirm that there was improvement in agility, coordination and balance, that several authors report on their studies, showing that physical activity can bring many benefits to the elderly. Thus, this study was effective in people over 60 years, since there was a decrease in the risk of falls. It was observed that there was significant improvement in the time of testing, being related to walking speed, since the less time they took , the less chances of the elderly to suffer falls and have their independence in carrying out their daily tasks.

Importantly, the aging population and consequently the increase in life expectancy, require preventive actions that can help control many risk factors of elderly people to suffer falls, thus promoting measures aimed at the participation of the elderly population on physical activity (Silva 2008).

So it is mainly geared to professionals in the health area, encourage and guide seniors physical activity, it is important to encourage them to do regular exercise, where the benefits will help to better quality of life.

CONCLUSIONS

This study aimed to analyze the influence of a combined training in the risk of falls in the elderly and the results show significant improvement in the time taken to perform the test. Thus, there was a migration of 40% of the elderly for the medium to the low risk of falls level. It is concluded that the findings of the study revealed that training may have contributed to decrease the risk of falls of the study participants, with good results in relation to balance, walking speed and risk of falls.

Therefore, the results of this study suggest that combined training can be effective in preventing falls among the elderly, but it is expected that further studies be conducted on the subject, encouraging physical activity, because the benefits that are associated with regular physical activity can contribute to improved functional capacity and quality of life for this segment of the population which is growing fast.

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EFFECTS OF COMBINED PHYSICAL TRAINING IN RISK OF FALLS IN THE ELDERLY

ABSTRACT

The growth of life expectancy and of the elderly population increases the profiles of morbidity and mortality, with increased prevalence of chronic diseases and events that can have serious consequences to the health of the elderly, such as falls. The study aimed to evaluate the influence of combined physical training on balance and risk of falling in older adult participants in a physical activity program for old adults in Guarapuava-Pr. This study was characterized as pre experimental. Twenty-seven subjects participated in the study, with an average age of 64.9 ± 2.9 years of age and body mass index of 30.3 ± 7.1 kg/m². The risk of falling and balance were assessed using the Timed Up and Go test, before and after a combined physical training program, composed of resistance exercises, aerobic and stretching exercises for 60 minutes, 3 times a week, during a period of 12 weeks. The training was conducted with the use of resistance machines and free weights, consisting of 12 exercises

for major muscle groups, from 1 to 3 sets of 10 to 15 repetitions. Aerobic training consisted of aerobic dance lasting 20 minutes and 10 minutes of stretching at the end of the session. To characterize the sample, data were analyzed using descriptive statistics and the Student's t test for repeated measures after verification of normality and homogeneity, considering the significant difference $p \leqslant 0.05$. The results demonstrated a significant decrease between pre and post test in the Timed Up and Go tests (11.96 ± SDs and 9.9 s, respectively). Regarding the risk of falling, there was an increase in the percentage of seniors classified as low risk and a decrease in the average risk (65% to 25% and 35% to 75%, respectively). Thus, we can conclude that the combined exercise training program may have brought benefits to participants, providing positive changes in their balance and, consequently, in the reduction of the risk of falling.

KEYWORDS: older adults; physical training; balance; risk of falling.

SOMMAIRE

L'augmentation de l'espérance de vie et vieillissement de la population signifie qu'il ya une augmentation dans les profils de morbidité et de mortalité, avec une prévalence accrue des maladies chroniques et des événements qui peuvent avoir des conséquences graves problèmes de santé, tels que les chutes. L'étude visait à étudier l'influence de l'entraînement physique combiné avec l'équilibre et risque de chute chez les participants âgés dans un programme d'activité physique pour les aînés de Guarapuava-Pr. Cette étude a été caractérisé comme un essai préalable. Vingt-sept personnes ont participé à l'étude, l'âge moyen 64,9 ± 2,9 ans et l'indice de masse corporelle de 30,3 ± 7,1 kg / m². Le risque de chutes et de l'équilibre ont été évalués en utilisant le temps Up and Go test, avant et après un programme d'entraînement physique combinée, composée de contre-résistance des exercices, aérobie et exercices d'étirement pendant 60 minutes, 3 fois par semaine pour une période de 12 semaines. La formation a été menée contre la résistance des machines et des poids libres, et se compose de 12 exercices pour les principaux groupes musculaires, entre 1 et 3 séries de 10 à 15 répétitions. L'entraînement aérobie se composait de 20 minutes de danse aérobie et 10 minutes d'étirements à la fin de la session. Afin de caractériser les données d'échantillon ont été analysés à l'aide de statistiques descriptives et test t de Student pour des mesures répétées, après vérification de la normalité et d'homogénéité, de différence significative compte tenu de la valeur de $p \leqslant 0,05$. Les résultats ont montré une différence significative entre le pré et post-Temps Up and Go test (11,96 ± DS et 9,9 s, respectivement). En ce qui concerne le risque de chutes, il y avait une augmentation du pourcentage de personnes âgées classées comme à risque faible et une diminution de risque moyen (65% à 25% et 35% à 75%, respectivement). Ainsi, on peut conclure que le programme d'exercice combiné de formation peuvent avoir apporté des avantages aux participants, offrant des changements positifs dans la balance et donc de réduire le risque de chutes.

MOTS-CLÉS: personnes âgées, l'entraînement physique, l'équilibre, risque de chutes.

RESUMEM

El aumento de la esperanza de vida y el envejecimiento de la población Eso significa que hay un aumento de la morbilidad y los perfiles de mortalidad, con una mayor prevalencia de enfermedades crónicas y los eventos que pueden tener consecuencias graves problemas de salud, tales como caídas. El objetivo del estudio fue investigar la influencia del entrenamiento físico combinado con el equilibrio y riesgo de caídas en ancianos participantes en un programa de actividad física para personas mayores en Guarapuava-Pr. Este estudio fue caracterizado como una fase previa al juicio. Veintisiete personas participaron en el estudio, con una edad media 64,9 ± 2,9 años y el índice de masa corporal de 30,3 ± 7,1 kg / m². El riesgo de caídas y el equilibrio se evaluaron utilizando el tiempo de levantarse y avanzar de prueba, antes y después del programa de entrenamiento físico combinado, compuesto por ejercicios de resistencia de venta libre, aeróbicos y ejercicios de estiramiento durante 60 minutos, 3 veces por semana durante un período de 12 semanas . La capacitación se llevó a cabo contra la resistencia de máquinas y pesas, y consta de 12 ejercicios para grupos musculares principales, entre 1 y 3 series de 10 a 15 repeticiones. El entrenamiento aeróbico consistía en 20 minutos de baile aeróbico y 10 minutos de estiramientos al final de la sesión. Para caracterizar los datos de la muestra se utilizó estadística descriptiva y la prueba t de Student para medidas repetidas después de la verificación de normalidad y homogeneidad, una diferencia significativa teniendo en cuenta el valor de $p \leqslant 0,05$. Los resultados mostraron una diferencia significativa entre el pre y el mensaje de la hora de levantarse y avanzar de prueba (11.96 ± DE y 9,9 s, respectivamente). En cuanto al riesgo de caídas, se produjo un aumento en el porcentaje de personas mayores clasificadas bajo riesgo y una disminución en el riesgo medio (65% a 25% y 35% a 75%, respectivamente). Por lo tanto, se puede concluir que el programa de ejercicios de entrenamiento combinado puede haber traído beneficios a los participantes, brindando cambios positivos en el equilibrio y reducir así el riesgo de caídas.

PALABRAS CLAVE: Ancianos, el entrenamiento físico, el equilibrio, el riesgo de caídas.

INFLUÊNCIA DO TREINAMENTO FÍSICO COMBINADO NO RISCO QUEDAS EM IDOSOS

RESUMO

O aumento da expectativa de vida e o crescimento da população idosa faz com que ocorra aumento nos perfis de morbidade e mortalidade, com aumento da prevalência de doenças crônico-degenerativas e de eventos que podem ter consequências graves a saúde do idoso, como as quedas. O estudo objetivou verificar a influência do treinamento físico combinado no equilíbrio e risco de quedas em idosos participantes de um programa de atividade física para idosos em Guarapuava-Pr. Este estudo se caracterizou como pré-experimental. Vinte e sete idosos participaram do estudo, sendo a média da idade 64,9 ± 2,9 anos e índice de massa corpora de 30,3 ± 7,1 kg/m². O equilíbrio e risco de quedas foram avaliados por meio do teste Time Up and Go, antes e após um programa treinamento físico combinado, composto por exercícios contra-resistidos, aeróbios e alongamentos, durante 60 minutos, 3 vezes por semana, num período de 12 semanas. O treinamento contra-resistido foi realizado em máquinas e pesos livres, sendo composto por 12 exercícios para os principais grupos musculares, entre 1 e 3 séries, de 10 a 15 repetições. O treinamento aeróbio foi composto de 20 minutos dança aeróbica e 10 min de alongamentos ao final da sessão. Para caracterizar a amostra os dados foram analisados por meio da estatística descritiva e teste t de Student para medidas repetidas após verificação de normalidade e homogeneidade, considerando diferença significativa o valor de $p \leqslant 0,05$. Os resultados demonstraram redução significativa entre o pré e pós no teste Time Up and Go (11,96±DPs e 9,9s, respectivamente). Com relação ao risco de quedas, houve um aumento do percentual de idosos classificado como risco baixo e diminuição no risco médio (65% para 25% e 35% para 75%, respectivamente). Dessa maneira, pode-se concluir que o programa de treinamento físico combinado pode ter trazido benefícios aos participantes, proporcionando modificações positivas no equilíbrio e consequentemente na redução do risco de quedas.

PALAVRAS-CHAVE: Idosos; treinamento físico; equilíbrio; risco de quedas.