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Effects of multi-sensory training on trunk mobility and balance in community-dwelling elderly

Efeitos do treinamento multissensorial na mobilidade de tronco e no equilíbrio em idosos comunitários

Efectos del entrenamiento multisensorial en la movilidad de tronco y en el equilibrio en ancianos comunitários

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This is an evaluative, quantitative descriptive study, which aimed to evaluate the effects of a multi-sensory exercise program on trunk mobility and balance of community-dwelling elderly attending a group of oriented physical exercises, held in the second half of 2018. The study included 20 older adults who have undergone an initial evaluation of the body mass index and balance Functional Reach Test and, after eight weeks, intervention to the Functional Reach Test. Multi-sensory exercises were performed twice a week, lasting 60 minutes, for eight weeks. The results showed that subjects had BMI 26.33 ± 4.48, what was considered within the normal range for the elderly; and for the Functional Reach Test the initial average was 31.98 ± 6.13 and after the intervention, 34.45 ± 8.77 (p=0.08), indicating that although there has been improvement in absolute values, the training was not sufficient to promote a significant improvement.
Descriptors: Aged; Health promotion; Exercise.

Este é um estudo avaliativo, quantitativo-descritivo, que teve como objetivo avaliar os efeitos de um programa de exercícios multissensoriais na mobilidade de tronco e no equilíbrio de idosos comunitários frequentadores de um grupo de exercício físico orientado, realizado no segundo semestre de 2018. Participaram do estudo 20 idosos que foram submetidos a uma avaliação inicial do Índice Massa Corpórea e Teste do Alcance Funcional e após oito semanas de intervenção ao Teste do Alcance Funcional. Foram realizados exercícios multissensoriais, duas vezes por semana, com duração de 60 minutos por oito semanas. Os resultados mostraram que os idosos apresentam IMC de 26,33 ± 4,48, considerado dentro do limite de normalidade para idosos e no Teste do Alcance Funcional a média inicial foi de 31,98 ± 6,13 e após intervenção, 34,45 ± 8,77 (p=0,08), indicando que embora tenha havido melhora em valores absolutos, o treinamento não foi suficiente para promover melhora significativa.
Descritores: Idoso; Promoção da saúde; Exercício.

Se trata de un estudio evaluativo, cuantitativo descriptivo, que tuvo como objetivo evaluar los efectos de un programa de ejercicios multisensoriales en la movilidad de tronco y en el equilibrio de ancianos comunitarios frecuentadores de un grupo de ejercicio físico orientado, realizado en el segundo semestre de 2018. Participaron del estudio 20 ancianos que fueron sometidos a una evaluación inicial del Índice de Masa Corpórea y Test del Alcance Funcional y después de ocho semanas de intervención al Test del Alcance Funcional. Fueron realizados ejercicios multisensoriales, dos veces por semana, con duración de 60 minutos por ocho semanas. Los resultados mostraron que los ancianos presentan IMC de 26,33 ± 4,48, considerado dentro del límite de normalidad para ancianos y en el Test de Alcance Funcional la media inicial fue de 31,98 ± 6,13 y después de la intervención, 34,45 ± 8,77 (p+0,08), indicando que aunque haya mejora en valores absolutos, el entrenamiento no fue suficiente para promover mejora significativa.
Descriptores: Anciano; Promoción de la salud; Ejercicio.

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INTRODUCTION

In the Public Health Policies, The Brazilian National Health Policy for Elderly Persons (PNSPI – in Portuguese), announced in 1999 by the Ministerial Decree No. 1395, has as a direction to recover, maintain and promote the autonomy and independence of the elderly, pointing out health collective and individual measures, in line with the principles and guidelines of the Unified Health System (SUS)[1].

The PNSPI reaffirms the importance of healthy ways of living during all stages of life, because aging is a natural process dependent on choices made throughout life, which requires promoting health at all ages, so that the individual is healthy when older, active and with functional capacity to perform activities[1].

In recent years it has been seen greater interest in relation to population aging, evidenced by the increase in the number of scientific studies. This is shown by the reversal of the population profile and growing number of people aged 60 years or over[2].

Analyzing the population health standards, it is observed that there have been improvements, which justifies the expansion of this age group; however, these achievements are far from being accessible in an equitable manner for different social classes and countries[3].

In Brazil, it was identified a gradual increase in the aging index in the period from 1970 to 2010. When it takes account of the regions observed, the following increases in the period are pointed out: North in 171%, Northeast in 241%, Southeast in 274% and South in 398%[4]. The number of older adults increased 18% in five years, surpassing 30 million[5]. The population aged 60 years or older in 2012 was 25.4 million. The elderly men represents 13.3 million, meaning 44% of the group and women represent 16.9 million, corresponding to 56% of the elderly[5]. This is demonstrated by the increasing feminization of the old age[6].

Taking into account the changes resulting from the aging process, strength and muscle mass decrease after 40 years, and this loss is more pronounced after 65 years[7]. The most important decline occurs in muscle power when compared to the force, what may cause disability in the elderly, which in turn increases the risk of death. Furthermore, there is a decrease in the number and type of fibers, more evident in type II, characterized as fast twitch fibers[7].

With the increasing age it is also possible to observe difficulty and decreased range of motion (ROM) in all joints. This is progressive over the years and most common in the elderly. Associating the loss of muscle strength and decreased flexibility, the ability to perform daily activities independently may be impaired. Therefore, the importance of including stretching exercises in physical activity programs[7].

The participation of the elderly in physical exercise activities that stimulate the neuromuscular system can ameliorate the functional decline related to the aging process and contribute to a healthier and independent lifestyle[8].

It is important to mention that physical activity, on a regular basis, has benefits on the sensory system, thereby decreasing the body oscillations[9]. Thus, a proposal for physical exercises that enhance the functional and physical gains of the elderly population, as the multi-sensory training, concurrently stimulate various sensorial systems[10].

Thus, to act on the prevention of falls and consequently the improvement of the balance, proprioceptive, sensorimotor exercises can be used, seeking better motor control ability and rebuilding the individual's dynamic stability[11].

Considering the increase in life expectancy and changes from the aging, it is necessary specialized care for this group of people who have individual characteristics and needs and, above all, with comorbidities. In many cases, it is difficult to distinguish the effects of aging on the physiological functions of physical fitness or disease. Therefore, a well-targeted multi-sensory activity program, respecting the specificity of each individual should be stimulated[9]. Especially in Basic Health Units (BHU), in which the access of this population is made easier because it is located near where the elderly live, and also

because of the link that it establishes with the health team.

In this context, this study aims to evaluate the effects of a multi-sensory exercise program on trunk mobility and the balance of the community-dwelling elderly attending a group of oriented physical exercises.

METHOD

It is an evaluative, quantitative descriptive study, approved by the Ethics Committee of UFTM, under Protocol n. 2189.

The project took place in UBS Dona Aparecida Conceição Ferreira, in Uberaba, Minas Gerais. The convenience sample was formed by elderly participants of the extension project gym group "Longevity", conducted by the Multidisciplinary Residency in Health (RIMS) of the elderly, of the Federal University of Triângulo Mineiro (UFTM).

Active seniors were included through the International Physical Activity Questionnaire (IPAQ)[12], aged 60 years or more, who agreed to be part of the project and carry out the necessary evaluations and, by signing the consent form. The criteria for non-inclusion were elderly with physical disabilities that exposed them to risks, pain, previous surgeries and who did not accept to participate in the project and perform the evaluations, as well as those who have had three consecutive absences in the interventions or missed the days of evaluations .

Participated in the project "Longevity" initially, 33 elderly, but only 20 elderly followed the pre-established criteria for participation in the study.

To characterize the sample the body mass index (BMI) was calculated by dieticians of RIMS. The evaluation of the Functional Reach Test was performed by pre-intervention physiotherapist and after 8 weeks of intervention.

To calculate the BMI: the elderly was placed on a digital scale Mondial Ellegance brand, with no shoes and with light clothing. Height was measured with a wall fixed tape from a meter. The equation BMI=weight/height was used to determine the BMI, with modified values for the elderly, by the Ministry of Health[13].

The Functional Reach Test (TAF) was used in the study, and elaborated in 1990[14]. TAF determines the anterior stability limit[14]. A tape was attached to the wall, parallel to the floor and positioned at the height of the elderly acromion. He was positioned with the feet comfortable, parallel to each other, perpendicular to the wall and near the beginning of the tape. With wrists in a neutral position, extended elbows and shoulder in 90º flexion, he has been instructed to perform the forward lean, presenting balance deficit to distances smaller than 15 cm.

The intervention took place in the eight-week period, beginning on September 4, 2018 and ending on October 24, 2018, twice a week and 60 minutes long. The site was safe and had the monitoring of physical therapists and a physician of UBS.

Each session was initiated with measurement of blood pressure, a warm-up with stretching (static and dynamic for 15'), strengthening exercises, mobility, proprioception, balance, coordination, aerobics for 35' and cool-down with stretching (static or dynamic in 10').

For intervention, a multi-sensory training protocol was established, consisting of bipedal stance and single-leg stance exercises, with or without support cane on the floor, eyes closed, stationary gait, anterior gait and displacements[10].

The materials used were bottles with water or sand, stick, tape for marking the floor and the local infrastructure to support.

Data were organized in a spreadsheet in Microsoft Excel version 2013. The statistical analysis was performed using SPSS v. 20 program, with the descriptive analysis in mean and standard deviation values. The data normality was performed by the Shapiro-Wilk test and intergroup comparison by the Wilcoxon Mann-Whitney test, with 5% significance level.

RESULTS

Of the 20 elderly participants of the study, two were male and 18 female. Age ranged between 62-83 years (mean = 70.45 ± 6.67). The mean

BMI was 26.33±4.48 with the lowest value found 19.84 and the highest, 38.87.

In the variable evaluated of the Functional Reach Test, the average evaluation was 31.98±6.13 and after the intervention in the reevaluation, 34.45±8.77 and, the minimum value 23 and maximum 43.83 at baseline and minimum value of 16.83 and a maximum of 50.83 in the evaluation after intervention, as shown in Table 1, indicating that although there was improvement in absolute values, training was not enough to promote significant improvement in TAF values.

It can be seen in Figure 1 the images A, B, C and D of the interventions used and space at BHU.

Table 1. Minimum and maximum values, mean, standard deviation and t-test evaluation and reassessment of TAF. Uberaba, MG, October 2018.

TAF	Minimum	Maximum	Mean and SD	T test
Evaluation	23,00	43.83	31.98 ± 6.13	p 0.08
Revaluation	16.83	50.83	34.45 ± 8.77	

Figure 1. Intervention group by multi-sensory training. BHU Dona Aparecida Conceição Ferreira. Uberaba, MG, October 2018.

DISCUSSION

Older people who participated in eight weeks of multisensory training were active, attending HBU and RIMS groups.

The results indicate a predominance of females, which shows the relationship with other studies in which there is a higher prevalence of this gender in groups of physical activity[15]. Most adherence of women in these activities is due to religiousness, motivational aspects, care for health, machism and creating bonds[16,17].

Regarding assiduous adherence to the program, 33 elderly were initially evaluated, resulting 20 in a continuous and assiduous way. The reasons for the discontinued frequency from the study varied widely, such as medical appointments, take care of the grandchildren, household services, travel, removal by medical restrictions, work and motivation. A study of an academy program of the city also showed a sense of demotivation and lack of time to practice, contributing to non-adherence to the practices[18]. However, in this study, it was observed that external factors were more evident and impacting than internal factors such as lack of motivation.

Physical evaluation showed the average BMI of 26.33, what indicates proper weight for the elderly, as values equal to or greater than 27 indicates overweight, according to the Ministry of Health[13]. This shows that the constant physical activity and the fact of being active help maintain good body mass index,

which is a protective factor for cardiovascular diseases[19].

The evaluation of trunk mobility and static balance performed by TAF showed that no elderly presented values lower than the recommended ones[14], neither before nor after the intervention, identifying the importance of physical activity in their good physical condition regarding the test evaluated, since they were already part of the "longevity" ("LongeVIDAde") program. This lifestyle is important to improve the life expectancy and a healthier life[20].

The results showed not significant improvement and again the precondition of the elderly, such as to be active and participate in the RIMS exercise group, as a possible factor. An increase in the degree of difficulty of the exercises could have shown greater gain. However, the risk of falls, as it is a training group, could be higher than the gains.

It is worth highlighting that, in absolute values, there was an improvement of mobility and postural balance. It should be considered that the baseline values for TAF (31.98cm on average) were higher than normal values previously established in a study in which 26.6 cm is considered for community-dewelling elderly and 15.4 cm for non-community-dwelling elderly[21]. Thus, there is the fact that, even with high trunk mobility values and postural balance, since they are active seniors and regularly attend activities in the BHU, they showed improvement in TAF results.

The risk of falls can be evaluated through TAF[22]. In the present study, better results were presented after the multi-sensory intervention.

A meta-analysis of 17 clinical trials, with a total of 4,305 older adults, compared the performance of physical exercise and its absence, showing evidence that exercise programs for preventing falls in older people not only reduce the rate of falls, but also avoid injuries resulting from them, as many of the risk factors for falls are improved by well established exercise programs[23], a result that resembles another study in which a resistance training program, balance, coordination and stretching showed functional benefits for the elderly[24].

It should be worth noting that older people who did not obtain a significant result in the revaluation were the least likely to have dedicated to the achievement of the physical exercises, doing the postures and movements in a limited way and bellow their full capacity. Many reported fear of falling and preferred to perform the balance exercises with manual support.

One must also consider the benefits of exercises performed in a group, such as encouragement of friends, socialization and prevention of depression, isolation and the feeling of well-being[25].

The oriented physical exercise group directed by the RIMS of the elderly, has shown great support over the years and always with new members. This shows how the health awareness is necessary and the dedication of a multidisciplinary team. The education activities in community health that occur in groups and events for users, such as: "Hiperdia", "Week of the Elderly", "Mother's Day" and "Father's Day", are conducted in partnership with BHU for better social interaction, disclosure practices of healthy living and sharing experiences.

The relevance of having these professionals training in various areas in a health service enables more effective interventions, prioritizing integrity and subjectivity. In addition, most accurate health actions and most likely to solvability occur, as they happen in a multidisciplinary manner. This is highlighted both for the training process of professionals, and for the organization of Primary Health Care, contributing to the comprehensive care with emphasis on health promotion[36].

Analyzing the public policies, it is seen that the PNSPI denotes the enhancement of active and healthy aging. It emphasizes that aging should be healthy, active and free of functional dependence, recognizing and practicing health promotion at all ages. Thus, it is necessary that health professionals, together with the community, recognize that disease prevention and health promotion is not limited to young people. Health

promotion does not address the elderly and prevention efforts should be incorporated into health care at any age and any level of attention, whether primary, secondary or tertiary[4].

CONCLUSION

The multi-sensory training program developed for eight weeks, with group work, was not enough to promote significant improvement in TAF values, which evaluates the trunk mobility and postural balance.

The sample size may be considered a limitation of the study, as well as the reduced number of professionals to accompany the elderly, as the risk of falling in this type of exercise. There are several benefits of exercises performed outdoor, but changeable weather and rain could have harmed. It is noteworthy as well, the need for dedication to the exercises to best possible gains.

The study carried out is in line with the terms of public policies, especially the PNSPI, targeting active aging with health promotion actions and disease prevention.

Data from this study allow us to conclude how satisfactory is the participation of the elderly in oriented physical exercise groups for maintenance and possible improvement, especially of the balance, which contributes mainly to the quality of life and the elderly functionality.

It highlights and recognizes the work of RIMS for the community, contributing to better training of health professionals, recognizing the need and multidisciplinary care to better serving users in active aging. With this training, these professionals become multipliers of a different way of working, making effective the principles of SUS.

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CONTRIBUTIONS

Mariana Resende Silva and **Núbia Galindo Nascimento** participated in the data acquisition and analysis and writing. **Lislei Jorge Patrizzi Martins** and **Isabel Aparecida Porcatti Walsh** participated in the study design and critical review. **Suraya Gomes Novais Shimano** participated in the study design, data collection and analysis, writing and critical review.

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