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Original Article

EFFECTS OF TABLE TENNIS PRACTICE ON BALANCE AND PHYSICAL FITNESS IN THE ELDERLY

EFEITOS DA PRÁTICA DE TÊNIS DE MESA NO EQUILÍBRIO E APTIDÃO FÍSICA EM IDOSOS

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RESUMO
O jogo de Tênis de Mesa não envolve grandes deslocamentos do praticante no ambiente, característica que pode promover maior segurança ao idoso em termos locomotores. Além disso, precisa de coordenação, agilidade, velocidade de reação, equilíbrio dinâmico, que têm sido foco das atuais recomendações de atividade física para a saúde de adultos e idosos. O objetivo deste estudo é investigar os efeitos da prática de tênis de mesa na aptidão física e funcional de idosos. Esta pesquisa apresenta delineamento quase experimental com um desenho paralelo e controlado. A amostra foi composta por 16 idosos, alocados 8 no grupo experimental (GE) e 8 no grupo controle (GC). A pesquisa teve duração de 18 semanas, sendo 2 semanas de avaliação (inicial e final) e 16 semanas de intervenção. As avaliações da aptidão física foram realizadas por meio dos testes de agilidade e equilíbrio e aptidão funcional. Na comparação intragrupo (pré-pós intervenção), o GE apresentou diferença significativa para a variável agilidade (pré: 15,6 ± 1,2 s; pós: 14,7 ± 0,7s). Além disso, o GE apresentou redução na Área (pré: 11,00±3,32 cm2; pós: 6,52±3,06 cm2), Amplitude AP (pré: 4,92±2,77 cm; pós: 3,28±0,58 cm) e velocidade ML (pré: 2,77±1,07 cm/s; pós: 2,31±1,03 cm/s) na postura Tandem com os olhos abertos. Nossos achados destacam a importância de um programa de Tênis de Mesa, administrado duas vezes por semana e composto por atividades de baixa a moderada intensidade, para promover um efeito benéfico na agilidade e equilíbrio de idosos fisicamente ativos.
Palavras-chave: Envelhecimento. Aptidão física. Biomecânica. Esportes com raquete.

ABSTRACT
The Table Tennis game does not involve large displacements by the practitioner in the environment, a characteristic that can promote greater safety for the elderly in locomotor terms. In addition, it needs coordination, agility, speed of reaction, dynamic balance, which have been the focus of current recommendations of physical activity for the health of adults and the elderly. The aim of this study is to investigate the effects of table tennis practice on physical and functional fitness in the elderly. This quasi-experimental research with a parallel and controlled design. The sample consisted of 16 elderly people, allocated 8 in the experimental group (EG) and 8 in the control group (CG). The research lasted 18 weeks, with 2 weeks of evaluation (initial and final) and 16 weeks of intervention. Physical fitness assessments were carried out using the agility and balance and functional fitness tests. In the intra-group comparison (pre-post intervention), EG showed a significant difference for the variable agility (pre: 15.6 ± 1.2 s; post: 14.7 ± 0.7 s). Also, the EG showed a reduction in Area (pre: 11.00±3.32 cm^2; post: 6.52±3.06 cm^2), AP Amplitude (pre: 4.92±2.77 cm; post: 3.28±0.58 cm) and ML speed (pre: 2.77±1.07 cm/s; post: 2.31±1.03 cm/s) in the Tandem posture with eyes open. Our findings highlight the importance of a Table Tennis program, administered twice a week and consisted of low to moderate intensity activities, to promote a beneficial effect on the agility and balance of physically active elderly people.
Keywords: Aging. Physical fitness. Biomechanics. Racquet Sports

Introduction

Table Tennis is a world-famous sport[1]. Its practice is not limited only to the competitive level, but extends to schools, clubs and community spaces. As it transits between different environments, there is a natural involvement between different age groups. In places where the practice is systematized, it is still possible to observe the integration of children, youth, adults and the elderly training in the same environment.

The Table Tennis game does not involve large displacements by the practitioner in the environment, a characteristic that can promote greater safety for the elderly in locomotor terms. In addition, it needs coordination, agility, speed of reaction, dynamic balance, which have been the focus of current recommendations of physical activity for the health of adults and the elderly[2,3].

The coordination takes place in the total configuration of the human body so that there is a sufficient execution of the strokes between the racket and the ball with different speeds. The agility happens in the transitions of the Table Tennis basic techniques, for example, between a forehand and backhand, that request the quick change of positioning of the corporal segments[4].

Dynamic balance is required when the techniques mainly involve the large oscillation of the upper segments. In this case, there is a change in the positioning of body masses in space and, therefore, requires the practitioner to have body stability with different postures[5].

Considering that the regular practice of Table Tennis can benefit the elderly in maintaining desirable levels of motor skills and physical qualities that will reflect in their activities of daily living[6,7], the purpose of this study was to investigate the effects of Table Tennis training on balance and physical fitness in the elderly.

Methods

Sample

This study is characterized as quasi-experimental, with a parallel and controlled design. The sample consisted of 16 elderly people, allocated 8 in the experimental group (EG) and 8 in the control group (CG) (Figure 1). Inclusion criteria were: being 60 years old or older, having physical conditions to participate in evaluations and interventions, signing the Free and Informed Consent Term, according to the rules recommended by Resolution No. 466/12 of the National Health Council (CNS). The exclusion criteria were: frequency above 75 percent, having neurological, cardiovascular, bone or joint problems, uncontrolled arterial hypertension or diabetes, excessive alcohol consumption and smoking. This project was approved by the Ethics Committee of the State University of Maringa (CAAE number 13333719.8.0000.0104).

Procedures

The invitation to participate in the research was made through the local press, and those who showed interest were recruited. Initially, subjects interested in participating in the study underwent cardiovascular risk screening in order to ensure eligibility for inclusion in the study. In this screening, a cardiologist performed a clinical history and physical examination.

Participants eligible for the study were divided into two groups: the experimental group, which performed Table Tennis training, and the control group, which continued performing the usual activities of daily living and was instructed not to start a sports program during the period of participation in the project.

The research lasted 18 weeks, with 2 weeks of evaluation (initial and final) and 16 weeks of intervention. Balance and Physical Fitness measurements were performed. Subsequently, the experimental group underwent 16 weeks of intervention with Table Tennis.

Table Tennis training protocol

The duration of the program was 75 min (1h and 15 min), twice a week, at moderate intensity, totaling 150 min per week of moderate intensity physical activities as recommended by WHO[3].

The structure of each training was composed of an initial moment of general and specific warm-up for the main joints that will be used, in sequence different movements of techniques from educational to the improvement of movements. Based on the techniques, the volunteers performed different game systems, individually or in pairs. The intensity during training was very light (warm-up and cool down) to moderate (techniques and games), as recommended by Garber et al.[2]. The planning of training in Table Tennis adapted for the elderly is described in Chart 1.

Class steps	**Exercises**	**Time (min)**	**Equipment**	**Intensity (%HR_{max})[2]**	Rating of Perceived Exertion (RPE)
Warm-up	- Exercises emphasizing shoulders and arms, leg, torso and neck.	5	No appliances	Very light <57%	<9
Techniques	- Racket adaptation - *Forehand* - *Backhand* - Service Types - *Slice* - *Smash*	20	Offical Table Tennis Mesa, Rackets, Balls	Light 57-63%	9-11
Break	- Hydration	10	-	-	-
Games	- Singles and doubles games	45	Official Table Tennis, Rackets, Balls	Moderate 64-76%	12-13
Cool down	- Exercises emphasizing shoulders and arms, leg, torso and neck.	5	No appliances	Light 57-63%	9-11

Chart 1 - Table Tennis training plan for the elderly

Source: authors

Balance – Stabilography[8]

Stabilography analysis comprises measuring the behavior of a person's center of pressure (COP) in a given posture[9]. For this analysis, a force platform (EMG System do Brasil®) was used.

The participants, individually, with bare feet[10], were instructed to remain on the force platform, in static posture for a time of 30 s. The location of the feet on the platform was demarcated so that there was a standardization in the positioning and distance between the feet[8].

This posture was performed in the following condition: bipedal with eyes open, bipedal with eyes closed, Tandem and Semi-Tandem with eyes open[11]. In the case of the condition with Eyes Open, the volunteer fixed the gaze on a fixed point positioned 2 m ahead[8].

During the collection time, the force platform recorded the ground reaction force and consequently its location[12]. With the location of the ground reaction force, it was possible, through the platform software, to obtain the following CoP values: the anteroposterior and mediolateral amplitude; the total displacement; the area; the direction of oscillation and anteroposterior and mediolateral speed.

Assessment of Physical Fitness

Physical fitness data of the elderly were collected using the battery of Rikli and Jones[13] and Side Steps Teste of Rodrigues[14].

Rikli and Jones Battery[13]

The assessment started with the strength and resistance levels of the lower limbs (Chair Stand), strength and resistance of the upper limbs (Arm Curl), physical mobility speed, agility and balance (Foot Up and Go), lower limb flexion (Chair Sit and Reach), flexibility of the upper limbs (Back Scratch), Alternate Aerobic Test (2-min Step Test). The battery of functional aptitude tests for the elderly was developed with the objective of evaluating the functional capacity of the elderly to carry out habitual activities, with safety and autonomy.

Agility - Side Steps Test[14]

Description of the test area: three parallel lines are drawn on the ground, 1.20 m apart, 1.00 m long and 5 cm wide. The performer starts standing, in an upright position and centered on the middle line, facing the administrator.

Test description: at the signal of already, the performer moves laterally to the right until one foot crosses the right line and touches the ground. Then, move sideways to the left past the middle line until the foot touches the other side of the left line. These movements are repeated as quickly as possible. The exultant must move only in the lateral direction. Skipping or balance movements are not allowed.

Evaluation Criteria: The time required to pass the middle line eight times was recorded in seconds. If the performer had made a mistake, a second and final attempt was given.

Statistical analysis

Intergroup Comparison with non-Normal distribution was conducted by U-Mann Whitney Test and with Normal distribution by Independent Student Test. Intragroup Comparison with non-Normal distribution was conducted by Wilcoxon Test and with Normal distribution was conducted by Paired Student Test. The significance level adopted was 5%.

Results

Table 1 shows the mean and standard deviation of the stabilography variables, for the experimental and control groups, in the pre and post moments.

Table 1 - Mean values and standard deviation (m ± sd) Stabilography variables of the experimental and control group in Pre and Post moments

Posture	Condition	Variable	Experimental		Control	
			Pre	Post	Pre	Post
Bipedal	Eyes Open	AP Amplitude(cm)	1.73±1.41	1.53±0.71	1.16±0.72	1.33±0.55
		ML Amplitude(cm)	2.67±1.10	2.45±1.21	2.14±0.79	2.16±0.53
		Displacement(cm)	39.50±10.53	35.03±7.29	36.38±9.33	36.28±11.30
		Area(cm^2)	2.69±1.49	1.95±0.49	1.97±1.93	2.24±1.06
		Angle(graus)	0.47±2.89	-0.79±3.00	0.65±3.01	1.31±2.67
		Speed_AP(cm/s)	0.79±0.32	0.71±0.13	0.67±0.24	0.81±0.25
		Speed_ML(cm/s)	0.90±0.17	0.79±0.20	0.89±0.17	0.83±0.24
	Closed Eyes	AP Amplitude(cm)	1.31±0.71	1.13±0.28	1.42±0.68	1.63±0.69
		ML Amplitude(cm)	1.90±0.42	2.07±0.36	**2.42±0.48** [a]	2.47±1.06
		Displacement(cm)	43.82±20.65	42.29±11.65	**47.00±15.95**[††]	42.51±15.19
		Area(graus)	1.59±0.79	1.65±0.72	2.65±2.09	2.59±1.88
		Angle(cm/s)	-0.76±2.98	-0.90±2.98	1.49±2.59	0.59±2.99
		Speed_AP(cm/s)	0.85±0.60	0.73±0.16	0.74±0.31	0.84±0.49
		Speed_ML(cm/s)	1.01±0.34	1.06±0.36	**1.22±0.37**[†]	0.99±0.20
Semitandem	Eyes Open	AP Amplitude(cm)	3.31±0.74	3.28±0.53	3.96±2.92	**3.47±1.63** [b]
		ML Amplitude(cm)	2.51±0.68	**3.47±0.92**[***]	3.17±1.47	2.36±0.93
		Displacement(cm)	69.87±20.92	76.94±28.76	95.70±55.79	68.46±18.88
		Area(cm^2)	4.94±1.56	5.50±1.47	8.72±7.88	4.87±2.81
		Angle(graus)	1.26±1.58	0.93±2.47	1.14±1.79	1.71±0.47
		Speed_AP(cm/s)	1.65±0.52	1.79±0.62	2.20±1.35	1.57±0.46
		Speed_ML(cm/s)	1.35±0.41	1.51±0.68	1.90±1.05	1.38±0.39
Tandem	Eyes Open	AP Amplitude(cm)	**4.92±2.77**[**]	3.28±0.58	3.83±1.45	3.39±0.76
		ML Amplitude(cm)	4.86±2.19	3.27±1.26	3.43±1.26	2.81±0.80
		Displacement(cm)	148.09±54.69	127.74±53.06	128.32±62.27	106.96±37.20
		Area(cm^2)	**11.00±3.32**[*]	6.52±3.06	8.84±5.24	6.44±3.48
		Angle(graus)	1.90±0.64	1.02±1.69	1.40±1.77	0.57±2.08
		Speed_AP(cm/s)	3.54±1.30	3.13±1.27	2.93±1.34	2.67±0.96
		Speed_ML(cm/s)	**2.77±1.07**[****]	2.31±1.03	2.57±1.37	1.88±0.65

Notes: Label: AP. anteroposterior; ML. mediolateral. 1) Intergroup Comparison (Pre-Pre)- U-MannWhitney :a(0.038); 2) Intergroup Comparison (Post-Post)-Independent Student: b(p=0.031).3) Intragroup Comparison (Pre-Post) - Paired Student: *(p=0.025); ***(p=0.002); ††(p=0.04); Wilcoxon: **(p=0.025);****(p=0.012);† (p=0.036)
Source: authors

In relation to stabilography, the Control group showed a higher value of the Amplitude ML in the Bipedal posture with eyes closed, in the pre-intervention condition compared with the Experimental group and of the Amplitude AP in the Semitandem posture with eyes open in the post-intervention condition compared with the Experimental Group.

In the intra-group comparison (pre-post-intervention), the Experimental group showed a reduction in Area, AP Amplitude and ML speed in the Tandem posture with eyes open. Also showed an increase in ML amplitude in the Semitandem posture with eyes open. In the same type of comparison, the control group showed a reduction in displacement and ML speed in the Bipedal posture with eyes closed.

Table 2 shows the mean values and standard deviation Romberg Indexes of the experimental and control group in the pre and post moments.

Table 2 - Mean values and standard deviation (m ± sd) Romberg indexes of the experimental and control group in Pre and Post moments

Posture	Variable	Experimental		Control	
		Pre	Post	Pre	Post
Bipedal	AP Amplitude(cm)	0.97±0.43	**0.83±0.29[c]**	1.32±0.33	1.37±0.60
	ML Amplitude(cm)	**0.82±0.38[a]**	1.02±0.51	1.22±0.36	1.17±0.51
	Speed_AP(cm/s)	1.02±0.25	1.05±0.20	1.11±0.11	1.08±0.51
	Speed_ML(cm/s)	**1.11±0.21[b]**	1.35±0.40	1.40±0.24	1.25±0.29

Notes: Label: AP. anteroposterior; ML. mediolateral. 1) Intergroup Comparison (Pre-Pre) - Independent Student: a(p=0.047); b(p=0.036); 2) Intergroup Comparison (Post-Post) - Independent Student: c(p=0.039)
Source: authors

The Romberg Quotients related to ML Amplitude and ML Speed of the Experimental group were lower than the Control group at the pre-intervention moment. At the post-intervention moment, the Experimental group had a lower AP Amplitude than the Control group. In the intra-group comparison, there were no differences.

Table 3 shows the average values and standard deviation of the physical and functional fitness variables of the experimental and control groups in the pre and post moments.

Table 3 - Mean values and standard deviation (m ± sd) physical (agility) and functional (Senior Fitness Test) fitness variables of the experimental and control group in Pre and Post moments

Variables	**Experimental**		**Control**	
	Pre	**Post**	**Pre**	**Post**
Chair Stand (rep)	21.7 ± 3.7	22.6 ± 6.0	16.0 ± 2.9[a]	20.0 ± 6.9
Arm Curl (rep)	23.4 ± 3.6	26.9 ± 6.9	22.4 ± 5.6	24.0 ± 4.8
Foot Up and Go (s)	4.9 ± 0.4	5.1 ± 0.5	5.7 ± 0.6[a]	5.5 ± 0.5
Chair Sit and Reach (cm)	6.1 ± 7.2	8.1 ± 10.1	4.1 ± 10.3	-0.9 ± 17.2
Back Scratch (cm)	6.4 ± 6.6	-3.1 ± 12.1	-1.8 ± 11.1	-2.6 ± 11.2
2-min Step Test (rep)	206.4 ± 20.4	220.7 ± 24.3	163.4 ± 60.9[a]	214.6 ± 49.7
Agility (s)	15.6 ± 1.2	**14.7 ± 0.7[b]**	**20.0 ± 3.2[a]**	**17.2 ± 4.0[b]**

Notes: Label: 1) Intergroup Comparison (Pre-Pre) - Independent Student: a(p≤0.05); 2) Intragroup Comparison (Pre-Post) - Paired Student: b(p≤0.05)
Source: authors

Regarding functional fitness, the groups showed a significant difference in the pre-intervention condition for the variables Chair Standing, Foot Up and Go, 2-min Step. Also, for the agility variable, regarding physical fitness. The experimental group had higher values for Chair Stand e 2-min Step Test, while the control group had higher values for the variables Foot Up and Go and Agility. The groups showed no difference after the intervention. In the intra-group comparison (pre-post intervention), both groups showed a significant difference for the variable agility.

Discussion

The purpose of this study was to verify the effects of training with Table Tennis on Balance and physical fitness in the elderly. The Table Tennis program was able to increase the agility and balance of elderly people who practiced Table Tennis training. These findings reinforce the recommendations of Physical Activity for the elderly, which include neuromuscular activities for this population and demonstrate the effectiveness of a table tennis program in improving balance and agility in the elderly.

Aging is associated with reduced functionality of most physiological systems[15] and certain cognitive functions such as reduced processing speed and certain memory skills[16], leading to a progressive loss of independence in activities of daily living[17]. On the other hand, regular physical activity and sports are effective and low-cost means for the prevention of chronic-degenerative diseases and to minimize the harmful effects of aging[2]. However, few studies have investigated the potential health benefits of different sports activities in the elderly, including Table Tennis[18].

The results of the COP refer to the three positions taken by the volunteers. These positions are differentiated by the size of the support base, from Bipedal to Tandem. After the intervention, the Experimental group showed a significant increase in the mediolateral amplitude, a reduction in the anteroposterior amplitude, a significant reduction in the area and in the CoP mediolateral velocity. The Experimental group (Table Tennis) showed a significant increase in stability after the intervention period, characterized by a reduction in the Anteroposterior amplitude, area and speed on reduced bases.

In the Bipedal posture, eyes open and closed, both groups did not show changes in their status in all situations. In the same bipedal posture and time on the platform, elderly water aerobics practitioners showed a decrease in AP amplitude after intervention of the same period[19].

This reduction was observed in the Experimental group only in reduced base posture. In the Semitandem posture, in the post-intervention moment, the Experimental group presented a 5% reduction in the Anteroposterior amplitude compared to the Control group. In Tandem Posture, eyes open condition, the Experimental group showed a 66% significant reduction in Anteroposterior Amplitude between the pre- and post-intervention situations.

In the Bipedal posture, eyes closed condition, the Experimental group showed a significant difference (ML amplitude) in the pre-intervention moment of 21% in relation to the Control group. In the Semitandem posture, Eyes Open condition, the Experimental group showed a significant increase of 27% in the ML amplitude.

In general terms, for the Experimental group, we observed for the AP and ML amplitudes a reduction in the OF condition compared to that of AO, while the control group showed an opposite behavior. This finding suggests that in the absence of visual feedback, the Experimental group is able to compensate its balance by other sensory pathways.

In the Bipedal posture, Eyes Open condition, both groups did not show significant difference, both in the pre and post intervention condition. Still in the same posture, in the closed eyes condition, the control group had pre-intervention displacement values 7% higher than those in the control group.

In the other postures, with reduced base, there were no significant differences in any of the situations (pre and post intervention). Such evidence is corroborated by results obtained from a study based on reduced posture training[20], whose result demonstrated that it did not cause a reduction in the displacement of the COP.

The trajectories of the COP are related to the amount of attention invested in postural control[21]. In the Tandem posture, in the Eyes Open condition, the Experimental Group showed a significant reduction of 67% and 17 %, respectively, in the post-test moment. The Tandem posture represents in protocol terms the greatest challenge for postural control. In this case, the Experimental group showed a significant increase in stability after the intervention period.

The COP angle represents the general distribution of the COP orientation (direction) on the surface[22]. In this study, the COP angle did not change in any of the postures / conditions. Therefore, in both groups of elderly people, vision predominantly controls the direction of projection of the center of pressure. Vision is a component of the sensory system that helps to inform the position and movement of the body in space[23].

In the Bipedal posture, eyes closed condition, the Control group showed a reduction in ML speed of around 19% in the post-intervention moment. In the Tandem posture, eyes open condition, the Experimental group showed a significant reduction in ML speed of 16% in the post-intervention moment. In both groups, post-intervention speed was reduced in postures and challenging conditions for postural control. Between these two cases, the Experimental group, presented an important response for maintaining body posture since it represents the variable of greatest sensitivity[24].

Romberg's Quotient quantifies the excess of the stabilography variable in the closed eyes condition[23] and is generally greater than one. The tenths above one represent the percentage affected on the variable with reduced vision. Values below one represents a reduction in the value of the variable in the closed eyes condition.

In the Bipedal posture, the Experimental group presented, in the pre-intervention moment, values of ML amplitude and ML Speed, in the order of 32% and 20%, respectively, lower than the control group. In the post-intervention moment, for the AP amplitude, the Experimental group presented values 40% lower than the control group.

In this study, after the intervention for the Experimental group, due to the AP amplitude being the only variable with significant difference in relation to the control group, it can be inferred that possible changes had less contribution from the visual system to maintain the bipedal static posture.

During the aging process, physical fitness shows a significant decline, mainly in health-related components such as aerobic fitness[15], muscle strength[25,26,27], muscular endurance, balance and flexibility[28] leading to a deterioration in their independence and functional capacity[25]. Scientific evidence has pointed out that physical activity has a fundamental role in maintaining the components of physical fitness in the elderly[29]. In this sense, the activities proposed for this population must involve aerobic exercises, muscular strength, flexibility, balance and agility[2].

In the present study, in addition to balance, there was an improvement only in the agility of the elderly who practiced Table Tennis. Although Table Tennis has moments of high intensity, the majority of efforts and the average effort when performed with the elderly was low to moderate intensity (data not shown). This could help explain the lack of change in most parameters of physical fitness. Another plausible explanation for maintaining physical fitness is the good physical condition of the elderly at the beginning of the program. As can be seen, most elderly people presented adequate values, according to the normative values proposed by Rikli and Jones[14], in the main components of physical fitness. On the other hand, agility improved significantly only in the Table Tennis group. These findings corroborate with another study that compared adults and elderly people who practice Table Tennis, the elderly who practiced were 11% more agile in relation to a group of sedentary people of the same age[30].The performance in reaction tests can reflect the cognitive function, that is, the better the performance in tests that require more accurate motor control and quick reaction, it is possible to reflect the situation to cognitive function[31]. Playing Table Tennis improves agility due to the perception of stimuli that the recurring practice develops, improving the decision-making processes and the motor system[32,33].

In the study by Naderi et al[18], elderly Table Tennis players performed better in the 4 m and 400 m gait tests when compared to their sedentary peers, these findings suggest that regular Table Tennis practice could favor the gait performance of the elderly for both short and long journeys. However, the study by Naderi et al[18] is cross-sectional in nature and compared elderly people who practiced Table Tennis for 11.6 ± 4.6 years (5 to 19 years), between 2 and 5 times a week, for 1.5 to 3 hours per session, with a significantly higher stimulus than that proposed in the present study.

The lack of control over food intake and the level of daily physical activity in both groups were the limitations of this study. The strength of this study includes significant short-term results in the agility and balance of seniors when Table Tennis teachers teach classes based on learning techniques and games.

Both physical qualities are protective for the movement of the elderly practitioner reducing risk of falls[34], since expressive gains in the quality of Table Tennis techniques will require greater range of motion and, consequently, greater balance and agility.

As, in Table Tennis, the frequency of movement is high, for the improvement of techniques, the elderly will need agility of movements, mainly of lower limbs to anticipate the posture in the playing area and balance, for a stable body composition at the time of the game. Greater range of motion will require greater displacement of the pressure center[35].

Conclusion

In conclusion, our findings highlight the importance of a Table Tennis program, administered twice a week and consisted of low to moderate intensity activities, to promote a beneficial effect on the agility and balance of physically active elderly people characterized by a reduction time in the Side Steps Test and a reduction in the CoP Anteroposterior amplitude, area and speed on reduced bases.

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