Effect of Resistance Training and Pilates on the Quality of Life of Elderly Women: A Randomized Clinical Trial

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Abstract

Objective: The objective of the study was to compare the effects of resistance training (RT) and Pilates on the quality of life (QOL) of elderly women. An experimental design study was carried out with a 12-week intervention. *Methods:* Elderly women (≥60 years) who did not practice any type of physical exercise regularly for at least 3 months were evaluated. The study included 41 elderly women who were randomly divided into three groups: 1- Pilates group (PG), 2- Resistance training group (RTG) and 3- Control group (CG). To assess QOL, the WHOQOL-OLD, WHOQOL-BREF and SF-36 questionnaires were used. The Wilcoxon-Mann-Whitney Test was used to analyze the evolution of intragroup variables and the Kruskal-Wallis test with Dunn's post hoc for intergroup analyzes. To compare the sample characterization variables between the groups, the chi-square test was used. *Results:* There was an improvement in the *Social Participation* domain for the PG (p=0.016). In the RTG, a significant difference was found for the *Mental Health* domain (p=0,019). In the CG, there was an improvement in the *Social Participation* domain (p=0.044) and Total WHOQOL-OLD Score (p=0.044). In the intergroup comparisons, there was a difference in the WHOQOL-BREF Total Score of the PG and RTG, with the PG presenting a better QOL at the beginning of the study (p=0.039). The *Vitality* (p=0,010) and *Mental Health* (p=0,024) of the RTG improved in relation to the PG. *Conclusion:* The groups analyzed improved their QOL after the intervention period.

Keywords: Quality of Life. Health of the Elderly. Motor Activity.

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INTRODUCTION

Population aging is a worldwide phenomenon. It is therefore important to assess the quality of life (QoL) of older adults to improve techniques and procedures and better understand the expectations of this population[1]. QoL is related to personal well-being and can be defined as an individual's perception of their position in life within a socio-cultural context, in relation to their objectives, standards and concerns[2,3].

Measures of QoL are an important indicator for evaluating health programs for older adults, due to their associations with physical activity (PA), morbidity and mortality[4]. Studies that have investigated the association between PA and QoL in older adults concluded that higher levels of PA are associated with a better QoL[4-10]. A recent review of the topic revealed that regular physical exercise improves the physical, social and emotional aspects of QoL[11]. Some evidence also suggests that regular PA may be associated with reducing depression, anxiety and distress, and improving mood[11-14].

Despite the benefits that are often related to PA in terms of improving the QoL of older adults, the evidence of this relationship is limited. Pucci et al.[1] state that most studies that have investigated this relationship are cross-sectional, and recommend further longitudinal and intervention studies. Despite the consistent association between PA and the *Physical* and *Mental* domains[15,16] of QoL, little is known about the other domains. Finally, to date no known study has compared the effects of RT and Pilates on the QoL of older women, especially using different questionnaires. Given the need to investigate how different types of PA affect the QoL of older people, the importance of verifying the effects of RT and Pilates on the QoL of this population is clear. Therefore, the objective of the present study is to compare the effects of RT and Pilates on the quality of life of older women.

METHOD

A parallel, randomized, pre- (week zero) and post-test (week 12) clinical trial, with a 12-week intervention, was performed. The study included older women (≥60 years old) who had not performed any type of physical exercise regularly for at least three months. Older women who did not have a doctor's certificate, or who had musculoskeletal problems that limited the practice of exercises, or uncontrolled chronic diseases or who missed more than 20% of the sessions, were excluded. The study was publicized through social media and on community sites with a high flow of visitors. The project was carried out in Brasília, in the Distrito Federal (Federal District), at the Centro Universitário Euro-americano de Brasília (the Euro-American University Center of Brasília), Brazil, from May to July 2016.

The older women were randomly divided into three groups: 1- Pilates group (PG), 2- Resistance training group (RTG) and 3- Control group (CG). Simple randomization was performed using a table of random numbers. The professor who coordinated the research was responsible for this process and also for registering and assigning the interventions to the participants. Blinding was used, in that the participants did not know the purpose of the study or whether they were part of the treatment or control group. Fifty women were selected to participate in the study, of whom nine dropped out. Thus, the sample consisted of 41 older women aged 60-84 years, with 13 allocated to the PG, 14 to the RTG and 14 to the CG (Figure 1).

In the PG, the exercises were performed on the ground, using body weight as a load and accessories (Swiss ball and dumbbells). The classes were held twice a week by a physical education professional trained in Pilates, who accompanied the group throughout the intervention, assisted by an intern. The classes were divided into three parts: warm-up exercises with dynamic stretching (10 min), general conditioning with dynamic and isometric strength exercises (40 min) and relaxation (5-10 min) according to the previously used protocol[17]. Each exercise sequence was performed once, with a maximum of ten repetitions. The first two weeks were used for adaptation, with pre-Pilates exercises that aimed to teach important concepts and the principles to be used during classes, such as: breathing, activation of the abdominal muscles and neutral spine position. From the third week onwards, basic ground exercises were added.

The intensity of the classes was moderate and increased initially in terms of volume and subsequently through the progression of the exercises. The exercises began with five repetitions each and as the students started to perform them correctly, following the principles of Pilates, the number of repetitions increased progressively up to ten. When the students reached ten repetitions, they continued to perform the exercise with ten repetitions for two more sessions and then moved on to the next progression step, which consisted of a more difficult variation of the same movement, again starting with five repetitions (Table 1).

The RTG classes were conducted by the same instructor, a Physical Education professional with experience in guiding this type of training. The instructor was assisted by two interns. A familiarization period of two weeks was applied in the devices before performing the ten-repetition maximum test (RM). During this period, the participants performed two sets of each exercise with a low load to learn how to reproduce the movement (70% of 10 RM). After this, the 10 RM tests were performed with the participants instructed to perform ten repetitions with as great a load as possible. To obtain this load, the sample group performed three attempts in each device, with an interval of three minutes between each attempt[17].

Six exercises were selected: two for the upper limbs (supine bench press machine and rowing machine), two for the lower limbs (Leg Press and flexor chair), and two for the trunk (hip and abdominal elevation). The sessions were held twice a week and lasted approximately 60 min, comprising: 10 min of warm-up, 40-45 min of resistance exercises and 5-10 min of stretching and warm-down, based on a previously conducted study[18]. The warm-up took place in the equipment itself using a light load and performing the exercise with 10-15 repetitions, while the final stretching was guided by the instructor at the end of the session (Table 2).

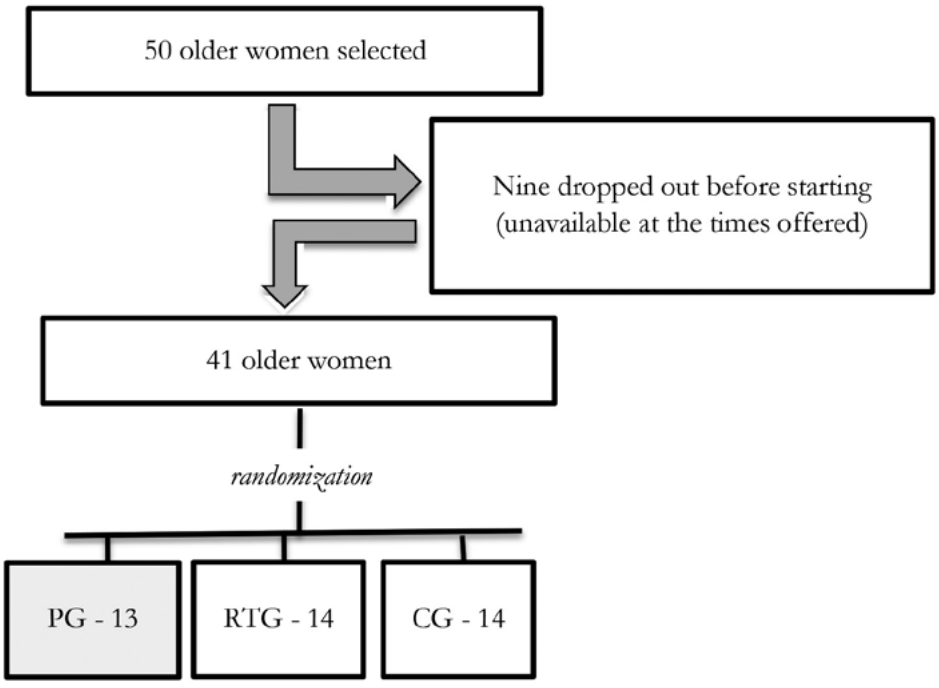

Figure 1. Flowchart showing the selection and exclusion of volunteers. Brasília (DF), Brazil.

PG = Pilates Group, RTG = Resistance Training Group, CG = Control Group.

Table 1. Description of the Pilates intervention program. Brasília (DF), Brazil. 2016

1st -2nd weeks	Repetitions
Breathing and control of the center	10
Imprint and release	10
Hip release	10
Support position	10
Arm elevation	10
Arm circle	10
Spine extension	10
Cervical preparation	10
Abdominal preparation	10
Spine mobility	10
3rd – 12th weeks	Repetitions
Breathing and control of the center	5-10
Standing spine stretch	5-10
Standing lateral trunk stretch	5-10
Standing spinal rotation	5-10
Upward rotation	5-10
Stretching of one leg	5-10
Hundred with legs bent	5-10
Bridge	5-10
Leg circle	5-10
Side kick	5-10
Bird dog	5-10
Half swan	5-10

Table 2. Periods of strength training. Brasília (DF), Brazil, 2016.

Weeks	Intensity (%10 RM)	Series	Repetitions
1st	70	2	10 to 12
2nd	70	2	10 to 12
3rd	80	2	10 to 15
4th	85	2	10 to 15
5th	85	3	10 to 15
6th	90	3	8 to 12
7th	90	3	8 to 12
8th	95	3	6 to 10
9th	95	3	6 to 10
10th	100	3	6 to 10
11th	100	3	6 to 10
12th	95	4	10 to 12

In the CG, various recreational and cognitive activities were offered, such as games and exercises for memory and motor coordination. The CG practiced their activities twice a week for 40 min. The activities were carried out in groups and there was interaction between the older women. In order to maintain motivation to continue in the study, light PA such as walking, balance exercises and joint mobility were offered every 15 days. The older women were asked to report any changes in their usual activities.

Sociodemographic information and health conditions were assessed through an initial questionnaire, together with the IPAQ instrument[19]. The short version IPAQ was applied in the first meeting with the older women to evaluate the level of PA and thus select which individuals met the inclusion criteria of the study. Only older women classified as inactive (0 min/wk.) or insufficiently active (1-149 min/wk.)[20] were included.

To determine the intensity of the PG classes, the modified Borg scale was used, as it correlates closely with HR and is easy to for older adults to understand[21]. Values ranging from three to five points for training intensity were adopted, the perception of exertion was evaluated in the middle and at the end of the session and the older women were previously familiarized with the scale.

To assess QoL, the WHOQoL-OLD, WHOQoL-Bref and SF-36 questionnaires were used. The WHOQoL-OLD is a specific instrument for older adults, adapted from the WHOQoL questionnaire. The WHOQoL-OLD module contains 24 questions divided into six facets: *Sensory Functioning, Autonomy, Past, Present and Future Activities, Social Participation, Death and Dying* and *Intimacy* [22].

The WHOQoL-Bref consists of an abbreviated version of the WHOQoL-100 questionnaire. The instrument consists of 26 questions, two on general QoL, and the others divided between the domains *Physical, Environment, Social Relations* and *Psychological.*

The SF-36 is a generic, multidimensional questionnaire and is the most widely used questionnaire for the assessment of QoL[1]. It consists of 36 items that evaluate eight QoL domains and are divided into two components: *Physical* and *Mental.* The component *Physical* comprises the domains *Physical Functioning, Physical Role Limitations, Bodily Pain*, and *General Health Perceptions*. The *Mental* component contains the domains *Vitality, Social Functioning, Emotional Role Limitations* and *Mental Health*[23]. All the data were collected by a team of previously trained evaluators and all procedures were standardized to increase the reliability of the evaluation.

The sample size was estimated by the G Power 3.1 software package. The software estimated the need for a total of 36 individuals. The following data were input: type of test: F tests; statistical test: ANOVA: repeated measurements, within the factors, effect size =0.6, α=0.05, power (1–β err prob) =0.95, number of groups =3, number of measurements =2 and correlation coefficient between repeated measurements =0.5.

The results were presented in descriptive statistics. All variables were submitted to the Shapiro-Wilk test to verify the distribution of the data. Since most variables presented non-Gaussian distribution, we chose to use nonparametric tests to analyze the evolution of intragroup variables (Wilcoxon-Mann-Whitney Test) and for intergroup analysis (Kruskal-Wallis test, with Dunn's *post hoc test*). The Chi-square test (χ^2) was used to compare the sample characterization variables between the groups. The statistical tests were applied with the significance level accepted at $p<0.05$.

The study was approved by the Research Ethics Committee of the UNIEURO University Center under protocol number 1,169,706. All participants signed an Informed Consent Form, containing all the information on the intervention. The clinical trial was registered through the REBEC platform under number RBR-6wghcx.

RESULTS

Most of the women were 60-69 years old (70%), married (60%) and had an unfinished high school education (46.3%). Almost all reported having a health problem, with arterial hypertension prevalent (63.4%). The majority also had some type of pain

(61%) and 65.8% used controlled medication. Table 3 characterizes the older women participating in this study and the comparison of these variables between the groups at the beginning of the study. The average age of the participants in each group was: 64.92 (± 3.93) for the PG, 67.07 (± 5.85) for the RTG and 69.93 (± 7.27) for the CG, with no significant difference between groups (Kruskal-Wallis test, p=0.157).

Table 3. Characterization of the sample of older women (n=41), Brasília, DF, Brazil, 2016.

	Pilates Group	Resistance Training Group	Control Group
	N (%)	N (%)	N (%)
Marital status*			
Married	6 (46.15)	9 (64.29)	9 (64.29)
Single - Widowed - Divorced	7 (53.85)	5 (35.71)	5 (35.71)
Education**			
Elementary School	4 (30.77)	3 (21.43)	9 (64.29)
High School	8 (61.54)	9 (64.29)	2 (14.29)
Higher Education	1 (7.69)	2 (14.29)	3 (21.43)
Pain			
Reported	8 (61.54)	9 (64.29)	8 (57.14)
Not reported	5 (38.46)	5 (35.71)	6 (42.86)
Comorbidities			
Reported	12 (92.31)	12 (85.71)	13 (92.86)
Not reported	1 (7.69)	2 (14.29)	1 (7.14)
Hypertension			
Hypertensive	9 (69.23)	9 (64.29)	8 (57.14)
Normotensive	4 (30.77)	5 (35.71)	6 (42.86)
Controlled Medication			
Uses	9 (69.23)	9 (64.29)	9 (64.29)
Does not use	4 (30.77)	5 (35.71)	5 (35.71)

N = number of older women,% = percentage within the group, in the variable considered; * Significant difference between the PG and the others (test χ^2, p= 0.011); ** Significant difference between the Groups (test χ^2, p <0.001).

In the PG the WHOQoL-OLD domain with the highest mean value was *Sensory Functioning*. The *Social Participation* domain had the lowest mean score at the time of initial collection, however, after 12 weeks a significant increase was observed (pre= 51.44 ± 21.37; post= 71.63 ± 14.35; p= 0.016), when analyzed by the Wilcoxon-Mann-Whitney test. The *Intimacy* domain had the lowest mean value at 12 weeks. The total WHOQoL-OLD score was high and increased throughout the intervention, although without statistical significance.

In the RTG, the *Sensory Functioning* domain had the highest mean value at the two evaluation times, while the lowest value was in the *Social Participation* domain.

In the CG, the *Sensory Functioning* domain had the highest mean score, while the domain with the lowest score was *Social Participation* (pre= 53.57 ± 19.26; 12 weeks= 69.20 ± 15.59), with a significant increase after 12 weeks of activities (p= 0.044). Another index that showed a significant increase was total *WHOQoL-OLD* score (pre= 85.43 ± 11.86; 12 weeks= 95.36 ± 10.54, p= 0.044)

In the intergroup comparisons (Kruskal-Wallis test, with Dunn's post hoc), the CG had a better score than the RTG in the *Past, Present and Future Activities* facet at 12 weeks (CG= 75.89 ± 14.47 versus RTG= 62.50 ± 11.76; p= 0.031). No significant changes were found in the other domains.

In the WHOQoL-Bref, the highest mean scores in the PG at both evaluation times were in the *Social Relations* domain. The domain that least contributed to the QoL of this group was *Environment*, with the lowest mean value.

The highest mean value in the RTG at the beginning of the study was in the *Physical* domain. At 12 weeks, the *Psychological* domain contributed most to QoL. The domain with the lowest mean score was *Environment*.

The domain that contributed most to QoL in the CG was *Psychological*. As in the other groups, the *Environment* domain had the lowest mean value at the two evaluation times in the study.

In intergroup comparison (Kruskal-Wallis test, with Dunn's post hoc test), a significant difference was observed at the pre-training evaluation in the *WHOQoL-Bref total score* between the PG (71.50 ± 10.07) and the RTG (60.98 ± 9.83), with the PG having a better QoL at the beginning of the study (p= 0.039). After 12 weeks of training, there was no difference between groups in the other domains of the WHOQoL-Bref. In the SF-36 evaluation, the domain that most contributed to QoL in the PG at the pre-training evaluation was *Physical Role Limitations,* while at 12 weeks it was the *Emotional Role Limitations* domain. The *Vitality* domain had the lowest mean score.

In the RTG, the domains with the highest mean values were *Physical Role Limitations* in the pre-exercise evaluation and *Social Functioning* at 12 weeks. The domain that contributed least to QoL was *General Health*. A significant difference was found for the *Mental Health* domain between the pre- (57.43 ± 7.94) and post (66.43 ± 9.55) training evaluations, with p= 0.019.

In the CG analyzes, the highest mean score was in the *Social Aspects* domain. The lowest mean scores were in the *Bodily Pain* domain in the pre-training evaluation and in *Vitality* and *Mental Health* in the post-training evaluation.

In the intergroup comparison, there was no difference between the groups in the pre-training evaluation (Kruskal-Wallis test, with Dunn's post hoc). After 12 weeks of training, the RTG showed significantly better results than the PG in the variables *Vitality* (p= 0.010) and *Mental Health* (p= 0.024).

Table 4 shows the results of the intra-group comparisons, analyzed by the Wilcoxon-Mann-Whitney test, of the WHOQoL-OLD, WHOQoL-Bref and SF-36 instruments at the two evaluation times.

Table 4. Quality of life of older women (n=41), using the WHOQoL-OLD (WO), WHOQoL-Bref (WB) and SF-36 (SF) instruments before and after 12 weeks of physical training. Brasília (DF), Brazil, 2016.

Instrument - Dimension	PG Pre Mean (±sd)	PG 12 Mean (±sd)	*p-value*	Pre RTG Mean (±sd)	RTG 12 Mean (±sd)	*p-value*	CG Pre Mean (±sd)	CG 12 Mean (±sd)	*p-value*
WO – Sensory Functioning	82.21± 15.49	80.29± 11.65	0.579	81.25± 14.71	83.48± 14.83	0.667	72.77± 18.44	83.48± 15.62	0.114
WO – Autonomy	63.46± 16.11	70.19± 20.60	0.336	63.84± 21.54	59.82± 14.02	0.804	65.63± 19.42	75.89± 18.81	0.194
WO - Past, Present and Future Activities	68.27± 16.03	74.52± 12.09	0.511	71.88± 13.59	62.50± 11.76	0.050	66.96± 13.07	75.89± 14.47	0.114
WO - Social Participation	51.44± 21.37	71.63± 14.35	0.016*	51.79± 20.57	58.48± 15.43	0.427	53.57± 19.26	69.20± 15.59	0.044*
WO - Death and Dying	74.04± 23.36	75.48± 23.73	0.840	61.16± 32.72	66.07± 29.29	0.769	58.93± 33.68	68.75± 23.89	0.571
WO – Intimacy	63.94± 18.07	64.90± 25.71	0.650	74.55± 20.14	63.39± 22.85	0.150	66.07± 27.38	72.77± 24.22	0.454
WO - Total score	88.71± 11.62	87.00± 10.60	0.243	88.71± 11.62	87.00± 10.60	0.804	85.43± 11.86	95.36± 10.54	0.044*
WB – Physical	71.67± 11.25	70.88± 15.07	0.880	66.79± 16.06	71.43± 15.60	0.352	63.72± 22.54	68.62± 17.73	0.401
WB – Psychological	75.00± 13.18	71.80± 13.08	0.801	65.77± 15.26	74.40± 12.10	0.077	75.60± 15.32	75.00± 13.48	0.874
WB - Social Relations	76.25± 12.67	73.72± 16.96	1.000	62.48± 18.41	64.29± 17.12	0.734	74.98± 18.49	73.21± 10.43	0.734
WB – Environment	65.85± 14.00	70.19± 11.24	0.362	55.79± 9.72	61.38± 9.85	0.114	60.70± 18.21	67.19± 11.08	0.246
WB - Total score	71.50± 10.07	71.65± 11.50	0.920	60.98± 9.83	67.88± 9.95	0.178	69.02± 10.52	71.01± 10.28	0.571
SF – Physical functioning	73.85± 16.09	80.00± 14.58	0.390	65.00± 24.81	68.57± 23.97	0.635	61.07± 24.90	70.36± 22.23	0.352
SF – Physical role limitations	82.69± 29.55	86.54± 19.41	0.960	71.43± 40.26	75.00± 36.96	0.839	58.93± 39.96	73.21± 34.62	0.306
SF – Bodily Pain	58.54± 14.93	72.38± 22.56	0.113	61.29±2 9.79	67.57± 20.70	0.541	53.07± 26.84	62.86± 28.79	0.401
SF - General State of Health	61.69± 8.64	61.08± 17.92	0.724	56.00± 11.00	58.36± 19.40	0.769	62.46± 9.01	70.71± 14.66	0.125
SF – Vitality	52.31± 14.52	50.38± 11.27	0.960	58.93± 14.83	62.86± 6.99	0.194	52.50± 13.69	60.36± 11.68	0.125
SF - Social Functioning	81.73± 21.42	89.42± 14.29	0.390	69.64± 30.11	82.14± 18.81	0.329	78.57± 15.83	87.50± 16.26	0.137
SF – Emotional Role Limitations	79.48± 34.81	92.30± 19.99	0.479	59.51± 47.46	73.80± 39.62	0.427	64.27± 40.23	76.16± 27.53	0.541
SF - Mental health	56.62± 5.85	56.92± 10.85	0.614	57.43± 7.94	66.43± 9.55	0.019*	56.86± 11.65	60.57± 9.39	0.178
SF - Physical Component	69.65± 12.42	75.00± 12.86	0.418	63.54± 19.44	67.38± 19.64	0.454	59.63± 19.41	69.29± 18.40	0.178

PG = Pilates Group, RTG = Resistance Training Group, CG = Control Group, SD = standard deviation; * Dif sig (p<0.05) between the pre- and 12-week evaluation, using the Wilcoxon-Mann-Whitney test.

DISCUSSION

The present study compared the effects of Pilates and RT on the QoL of older women. Improvements were observed in some QoL domains after 12 weeks of moderate exercise, with 2 sessions/week. This period was sufficient to produce significant changes in the psychological, but not the physical aspects of QoL. This suggests that to achieve the latter, a longer intervention time and/or greater exercise intensity would be required.

Confirming this hypothesis, in a study by Fonte et al.[24], older participants in an PA program in the community were evaluated, and the authors found that longer participation in the program was associated with a better QoL. Vieira et al.[25] evaluated Pilates practitioners and found similar results, with significantly higher scores among those who had been practicing Pilates for more than a year than among those who had been practicing for three months. However, the participants in the present study had a high mean score in the WHOQoL-OLD domains and total score, showing that they had a good QoL, which was maintained throughout the study period.

The participants in the present study had a high mean score in the domains and total WHOQoL-OLD score, showing that they already had a good QoL and this was maintained throughout the study period.

The *Social Participation* facet assesses the involvement of older adults in daily activities, especially those practiced in the community, satisfaction with levels of daily activity and with the use of one's time. This was one of the most compromised facets in the analysis of QoL, with the lowest mean score in all the groups at at least one evaluation time. Data consistent with the findings of the present study were also found in other studies[15,26], with the lowest QoL scores found in the *Social Participation* facet. Such social disengagement becomes more evident after 75 years of age, and is influenced by several factors such as retirement, widowhood and health problems, in addition to being associated with greater cognitive and motor decline[27,28].

However, at 12 weeks, there was a significant increase in this aspect in the PG and CG groups. An increase in the mean score in this facet was also observed in the RTG, but it was not significant. In other words, the involvement of older women in the study, in addition to providing physical and psychological benefits, contributed to the exchange of experiences and social activities with people of the same age group and gave them a better perception of QoL in this regard. In this perspective, it is essential that older adults are encouraged by health professionals and family members to participate in activities in the community that favor such an insertion in social life.

Another facet worthy of note in the evaluation is *Sensory Functioning*. This facet, which assesses sensory functioning and the impact of sensory losses on QoL, had the highest mean score in the three groups at the two assessment points. The sensory organs allow older adults to perceive the different situations which surround them in the environment in which they live, contributing to their integration with the environment[29]. For the older women evaluated, these issues were not evaluated negatively, possibly because they were younger seniors, for whom such sensory losses may not be especially present in their daily lives. In a study with active older women, Vagetti et al.[15] also found that the facet with the highest mean score was *Sensory Functioning*.

The CG had better scores in the *Past, Present and Future Activities* domain at the second evaluation time than the RTG. This facet describes satisfaction about achievements in life and the things that one yearns for. Often retirement, or children leaving home, makes older adults feel inadequate in their new role in society. With the perception that they are no longer needed, older adults have difficulty fitting into their social group and retaining perspectives of the future, and so tend to isolate themselves and exclude themselves from society, further accelerating the aging process[11]. It should be noted that the scarcity of research on the relationship between the WHOQoL-OLD questionnaire and the training methods investigated made it difficult to discuss the results, in order to establish comparisons with other studies.

In the initial evaluation, the total QoL of the RTG, assessed by the WHOQoL-BREF, was lower than that of the PG. After 12 weeks of training,

however, the QoL of the participants of the two groups was equal. In other words, 12 weeks of moderate intensity RT were shown to be effective in improving the general QoL of practitioners in this group. The results of this study have been confirmed by others that demonstrate that there is indeed a positive relationship between PA and QoL. However, the type of PA and the intensity at which the activity is performed influences and contributes to different aspects of the overall QoL and also its domains[15,30].

Studies found in literature that analyzed the effects of general PA on specific QoL domains found a more frequent association between PA and the *Psychological* and *Physical* domains[1,15,16,31]. In analysis with the WHOQoL-BREF, neither domain showed a significant difference, however, the highest scores were in the *Psychological* domain. At the end of the study the highest mean scores of both the RTG and the PG were in the *Psychological* domains, suggesting that the activities performed improved the self-esteem and body image of older adults, improving their perception of this domain.

The *Environment* domain, despite not exhibiting a statistically significant difference, had the lowest mean score in the three groups at the two evaluation times. A household survey carried out with 1691 older people also obtained the lowest QoL scores in the *Environment* domain, corroborating the data found in the present study[26]. The authors believe a possible hypothesis for this result is related to the limited financial resources of older adults, which can contribute to more fragile security and housing conditions and fewer opportunities for leisure and recreation. The physical environment in which older adults are inserted can have a positive or negative influence on QoL[32]. According to the WHO[20] (2010), older adults who perceive the environment in which they live as being unsafe and having few leisure attractions are less likely to leave the house, becoming more susceptible to social isolation and depression.

When evaluating the SF-36, it was noticed that at the end of the intervention the RTG and the CG had higher *Vitality* scores than the PG. The *Vitality* domain evaluates levels of energy and fatigue, with low values meaning the individual feels tired and worn out most of the time, and high values indicating that they feel animated and energetic[23]. Although this domain includes issues that seem to be influenced by the practice of PA, this relationship has not yet been made clear in literature. A review on the subject found that existing evidence on this relationship remains inconsistent[33].

The *Mental Health* domain improved significantly in the RTG. A similar result was found in the study by Kimura et al.[34], where only this domain improved among older adults after 12 weeks of RT. The authors argue that the lack of positive results in other QoL domains is not related to the ineffectiveness of the PA program, but rather, is explained by the fact that the sample investigated was composed of healthy and active older adults who had a good QoL at the beginning of the intervention, as in the present study. Pimenta et al.[35] found that the regular practice of PA was associated with better QoL in the *Mental Health* domain in retirees. Vagetti et al.[15] in their systematic review of QoL and PA in older adults, found that the evidence gathered points to a consistent association between PA and the *Mental Health* domain. This domain is associated with issues related to four dimensions: anxiety, depression, loss of emotional control and psychological well-being[23]. In the present study, the fact that the older adults were beginning a new PA program and had a new purpose in life with a twice-weekly commitment, with greater social participation, proved to be beneficial for the mental health of older participants in the RTG.

The study had some limitations: (1) only women were evaluated, which prevents us from expanding the findings to both sexes; (2) the lack of representativeness of the sample, in relation to the city of Brasília; (3) the broad age range of the sample; (4) the use of the IPAQ questionnaire to assess the practice of PA, which, as it is based exclusively on memory, may overestimate or underestimate the level of PA; and (5) the fact that the CG participated in activities that may have benefited QoL.

However, despite these limitations, it is important to highlight the relevant aspects of the study, namely: (1) the randomized experimental design and blinding of the participants, who were not aware of the purpose of the study, or whether they were part of the control or treatment group; (2) the originality of

comparing the effects of QoL in older practitioners of Pilates and RT (no similar study has been identified in literature to date); (3) the application of the most frequently used QoL questionnaires in literature, including the analysis of general and also specific QoL for older adults. Furthermore, the evaluation of different questionnaires allowed for a more complete evaluation, as they address different QoL domains.

CONCLUSION

In closing, it was found that both Pilates and resistance training proved effective in improving the quality of life of the older adults investigated, and should be encouraged among this population. The findings of the present study make a relevant contribution to the understanding of health professionals of the relationship between exercise and quality of life, contributing to the implementation of health interventions aimed at promoting quality of life in older adults.

However, further investigations with larger samples, stratified by sex and age, are required to assess how these two types of exercise relate to the different domains of quality of life.

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