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PREVENTION & REHABILITATION: Randomized Clinical trial

Influence of a Pilates exercise program on the quality of life of sedentary elderly people: A randomized clinical trial

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ABSTRACT

This study evaluated the influence of a Pilates exercise program on the quality of life (QOL) of sedentary elderly women. Twenty-four elderly women (aged 64.8 ± 3 years) participated in this study. Participants were divided into two groups: a Pilates Group (PG) and a Control Group (CG). The women in the PG performed 30-min sessions of Pilates (on the ground and using appliances) twice a week over six months. To evaluate the QOL, the SF-36 survey was used. The PG achieved significant improvements in 7 out of 8 domains in the survey: functional capacity ($p = 0.00$), physical aspects ($p = 0.03$), pain ($p = 0.00$), general health condition ($p = 0.04$), vitality ($p = 0.02$), social aspects ($p = 0.03$) and mental health ($p = 0.05$). Our results showed that implementation of a Pilates program can improve QOL of sedentary elderly women.

1. Introduction

The World Health Organization defines quality of life (QOL) as "one's perception about one's life, in a cultural context, and the value in the system one lives and his or her relation with goals, expectations, standards and concernments, including physical health, psychological health, levels of independence, social relations, environmental characteristics and his or her spiritual standard" (Vieira et al., 2013).

"The continued aging of the world population is notable. According to the census by the Brazilian Institute (IBGE, 2014), in Brazil there are 191 million inhabitants, and out of these 31% are elders, and it is estimated that by the year 2060 the number of elderly people will reach 34%. In Brazil everyone who is 60 years old or older is considered to be an elder. The relationship between physical activity, quality of life and the aging process is therefore increasingly discussed and analyzed, with agreement between health-care professionals that an active life style predicts the likelihood of aging with an enhanced quality of life" (Fernandes and Lacio, 2011).

The practice of physical exercise using the Pilates method, as developed by Joseph Hubertus Pilates, is increasing rapidly in Brazil (Silva and Mannrich, 2009; Aladro et al., 2012). This method consists of a program of physical and mental training involving specialised exercises, including resistance and dynamic stretching, synchronized with breathing, and respecting the following principles: control, precision, centralization, fluidity of movement and concentration. The benefits of the method include the improvement of strength (Muscolino and Cipriani, 2004), flexibility (Schroder et al., 2002), posture (Kaesler et al., 2007; Junges et al., 2012) and motor abilities (Siqueira Rodrigues et al., 2010; Cakmakçi, 2011). Since quality of life during the aging process is related to the characteristics mentioned, this study aimed to verify the effects of a Pilates exercise program on the QOL of sedentary elderly people.

2. Methods

This blind, controlled clinical trial is part of a Doctoral Thesis in Biomedical Gerontology approved by the Ethics in Research

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Table 1
Total quality of life scores before and after the Pilates program.

QOL	Before		P	After		P
	Pilates (n = 9)	Control (n = 11)		Pilates (n = 9)	Control (n = 11)	
X±SD	70.8 ± 23.9	64.2 ± 15.5	0.37	92.1 ± 11.2	65.2 ± 20.5	0.00[a]
Min	34	34		65	34	
Max	92	82		100	92	

QOL (quality of life).
n = number of cases, X = mean, SD = standard deviation, Min = minimum value, Max = maximum value, P = p value according to the Mann-Whitney *U* test.
[a] Statistically significant.

Committee of the Catholic Pontifical University of Rio Grande do Sul under the number 929.768 on 6th of February 2015.

A population of 776 sedentary elderly women residing in the city of Lages/SC was evaluated. After the sample calculation, 24 elderly women were selected and randomly divided into two groups, with 12 in the Control Group (CG) and 12 in the Pilates Group (PG). Randomization was performed by random drawing, where each elderly woman was identified by a number. A volunteer, blind to the participants, made the draw, with the first number drawn for GP, the second number drawn for GC and so on respectively. The study was considered blind because the personnel who performed the survey did not know which group individuals had been allocated.

The inclusion criteria were: age between 60 and 69 years, residing in the city of Lages/SC, availability to perform the sessions, sedentary (Nahas, 2010) and non-smokers. Criteria for exclusion were: severe chronic, cognitive, and neurological disease that made the realization of the procedures impossible. Women who did not attend 90% of the Pilates program or did not attend the re-evaluation were eliminated from the study analysis.

The women in the PG group were invited to participate in twice-weekly 30-min exercise sessions during a six-month period of intervention. The program included Mat Pilates exercises (Pilates, 2010), Cadillac, Reformer, and Chair, which focused on strength, flexibility, and balance in several postures and muscular groups with emphasis on paravertebral, abdominal, and lower limb musculature. The exercise program included an eight-week physical adaptation phase, which involved repair of the muscular and ligament tissues after physical, chemical, or metabolic stimulation in order to adapt them to the movement and avoid lesions (Cycle 1). The second phase involved increased resistance and intensity of the exercises (Cycle 2) over a nine-week period. The third phase involved maintenance of resistances (Cycle 3) over an eight-week period (Molnar, 2012; Junges, 2014; Nahas, 2010). The exercises followed the recommendations of the Pilates method exercise protocol outlined in *"PhysicalMind Institute"* (Molnar, 2012). The women in the CG were advised not to change their daily activities during the term of this research. The participants signed a Term of Consent document, which explained the procedures and objectives of this study.

All the women in both groups were evaluated with the SF-36 survey (Ware and Sherbourne, 1992), which is an instrument for the evaluation of QOL related to health. It is considered a multidimensional survey, formed by 36 items comprising eight domains: functional capacity (FC), physical aspects (PA), pain (P), general health condition (GHC), vitality (V), social aspects (SA), emotional aspects (EA) and mental health (MH). It has a score for each area, (0–100), in which zero corresponds to the worst condition and 100 corresponds to the best condition (Ciconelli et al., 1999).

The women were evaluated before and after the Pilates program. The first evaluation was undertaken one week before starting the program and the second evaluation was undertaken one week after finishing the whole program, with an approximate gap of six weeks between them.

Statistical analysis was performed using SPSS 20.0 for Windows 8. The exploratory data analysis was done through descriptive statistics, which considered attendance and percentage for qualitative variables, and means, standard deviation, minimum value and maximum value for quantitative variables. For data normality analysis, the study used the Shapiro-Wilk test. To verify the differences in the means between the groups, before and after the intervention, the Student's T test was used for normal distributions (variables FC, FA, P, GHC, V and SA) and the Mann-Whitney *U* test for asymmetrical distributions (variables QOL, EA and MH), with the level of significance fixed at 5% ($p < 0.05$) (Hulley et al., 2008).

3. Results

Twenty-four women were evaluated and 20 re-evaluated, including 9 (aged 63.7 ± 3.3 years) from the PG and 11 (aged 65.2 ± 3.0 years) from the CG. As for general characteristics, 65% (n = 13) were married, 90% (n = 18) were Catholic, 40% (n = 8) attended primary school, 20% (n = 4) attended college, 65% (n = 13) were retired and 85% (n = 17) had an income of between one and

Table 2
Quality of life domain scores before and after the Pilates program.

Period Group		Before		P	After		P
		Pilates (n = 9)	Control (n = 11)		Pilates (n = 9)	Control (n = 11)	
FC	X±SD	82.2 ± 15.4	65.9 ± 26.4	0.12	91.6 ± 14.3	62.6 ± 24.4	0.00
PA	X±SD	61.1 ± 46.9	65.9 ± 40.7	1.00	92.7 ± 14.8	52.2 ± 43.9	0.03
PAIN	X±SD	67.0 ± 22.2	51.0 ± 23.6	0.12	95.7 ± 6.9	52.2 ± 17.5	0.00
GH	X±SD	67.8 ± 22.5	67.5 ± 19.1	0.75	89.4 ± 11.2	76.7 ± 16.3	0.04
V	X±SD	63.3 ± 23.3	66.3 ± 16.2	0.73	85.5 ± 13.5	70.0 ± 14.9	0.02
SA	X±SD	81.8 ± 27.3	74.6 ± 19.4	0.25	97.2 ± 8.3	77.9 ± 23.9	0.03
EA	X±SD	74.0 ± 43.4	54.4 ± 47.3	0.37	92.6 ± 22.0	57.5 ± 49.6	0.06[a]
MH	X±SD	72.8 ± 18.5	73.0 ± 13.0	0.97	88.8 ± 10.5	75.2 ± 17.6	0.05[a]

FC (functional capacity); PA (physical aspects); PAIN (pain); GH (general health); V (vitality); SA (social aspects); EA (emotional aspects); MH (mental health).
n = number of cases, X = mean, SD = standard deviation, P = p value according to the Student's T test or Mann-Whitney *U* Test.
[a] Statistically significant.

three minimum wages.

Over the study period, a significant increase in QOL was observed in women from the PG ($p = 0.00$), while the QOL in the CG remained unchanged (see Table 1). In the PG, all domains showed significantly better results, except for EA ($p = 0.06$). Women in the CG showed worse results for FC and PA (see Table 2).

After the program, 89% of the women from the PG obtained a classification of great for QOL (see Fig. 1); however, 46% of the women in the CG considered their QOL to be bad or poor (see Fig. 2).

4. Discussion

The present study investigated the effects of a Pilates exercise program on the QOL of sedentary elderly women. Our findings are consistent with previous studies in the literature that have also reported an improvement in aspects related to QOL in individuals who practice Pilates. However, some other studies oppose our findings. For example, Siqueira Rodrigues et al. (2010) investigated the effects of Pilates on the QOL of 52 sedentary women (aged 66 ± 4 years) by comparing a CG and a PG. The PG performed Pilates exercises twice a week for eight weeks, but did not achieve significantly better QOL results. Furthermore, Oliveira et al. (2015) used the SF-36 to evaluate the QOL of 31 adults (aged 63.62 ± 1.0 years) by comparing a CG and a PG. The PG performed two 60-min Pilates sessions per week, and the CG performed two sessions of static stretching per week. The QOL results were not significantly different.

In agreement with our findings, Leopoldino et al. (2013) used the SF-36 to evaluate the QOL in 21 sedentary adults (aged 22 ± 2 years) before and after a 12-week Pilates program (twice a week for 60 min), and obtained significant changes in QOL, and presumed that the Pilates method contributed to the improved QOL of that population. Natour et al. (2015) also used the SF-36 to evaluate the QOL of individuals with lumbar pain who were taking painkillers. Sixty individuals between the ages of 18 and 50 participated in this study. A PG performed six months of Pilates and a CG remained only on medication, without any intervention during this term. The results showed improvements in the PG in functional capacity and vitality, as well as pain relief. Moreover, Kuçükçakir et al. (2013) investigated the QOL of sixty women between the ages of 45 and 65 years who were diagnosed with osteoporosis using the SF-36 and QUALEFFO-41. The PG performed Pilates exercises for one hour twice a week for one year. In turn, the CG performed the same exercises at home during the same term. The results presented an improvement in both groups in all areas. However, the improvement in the PG was significantly better.

Although some studies have used scales other than the SF-36 to evaluate QOL in individuals who practiced Pilates, the majority have demonstrated improvements in the same aspects. Angin et al. (2015) used the QUALEFFO-41 to evaluate the QOL of 41 elderly women (aged 58.23 ± 5.46 years) diagnosed with osteoporosis. The women from the PG performed three 60-min sessions of Pilates per week over a 24-week period. The authors found significant QOL improvements in the PG.

Another instrument cited is the WHOQOL-Bref, used by Zen (2015) who evaluated the QOL in 200 individuals (aged 39.9 ± 12.8 years). Of these, 144 were women and 56 were men. One hundred practiced Pilates two or three times a week for at least six months and one hundred were sedentary. The mean QOL score in the group of individuals who practiced Pilates was higher in all areas: physical, psychological, social, and environmental when compared to the other group. There was a statistically significant difference in the QOL of the practitioners and sedentary individuals,

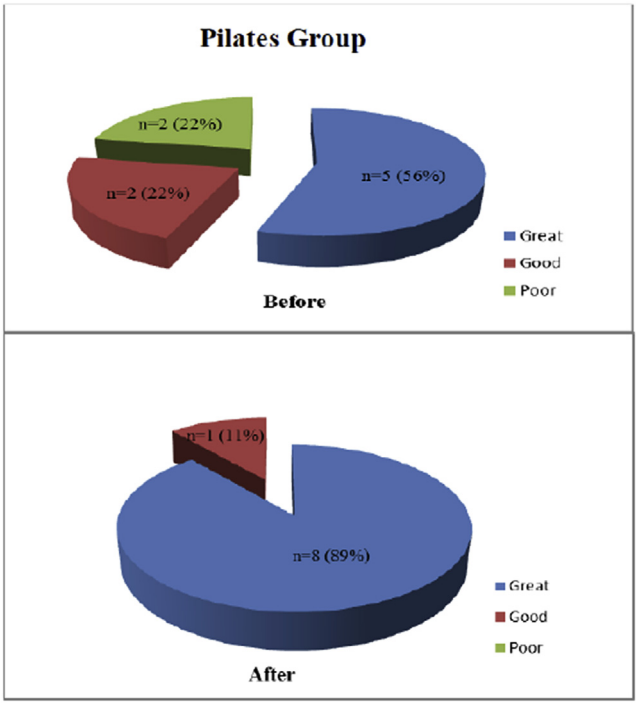

Fig. 1. Quality of life classification before and after the Pilates program in the Pilates Group.
n = number of cases.
% = percentage.

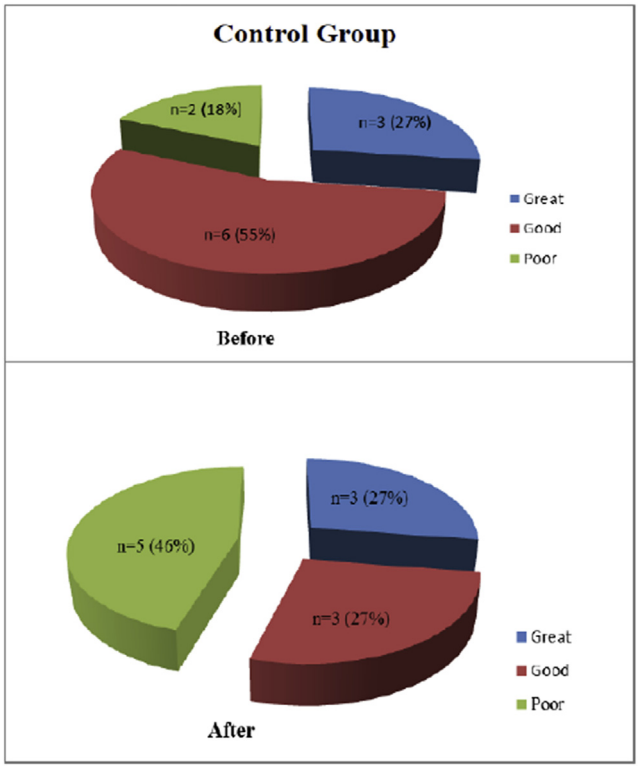

Fig. 2. Quality of life classification before and after the Pilates program in the Control Group.
n = number of cases.
% = percentage.

but the practitioners showed, in all scores evaluated, higher quality of life. These findings support the findings in this study.

The WHOQOL Group (1995) defines QOL as the way one perceives one's momentary position in life, considering the local and cultural context, as well as one's values, goals, expectations, standards and concerns in life. Studies show that variables related to physical performance, such as strength, flexibility, coordination, and balance, are highly associated with health condition and QOL (Mazzarino et al., 2015). In elderly populations, physical exercise is an important aspect in promotion of QOL because during the process of aging, several physiological changes occur.

The studies mentioned above provide evidence that the practice of the Pilates method may contribute to improved QOL in people of different age groups. In this study, the practice of Pilates by elderly women with a sedentary life style showed that several QOL items can be improved, particularly those related to physical aspects, such as FC. The maintenance of FC has a relevant impact on QOL, because it means the capability to act independently in daily life, including locomotion and decision-making, and this enables older individuals to lead a normal life without depending on caregivers.

In addition to confirming the benefits of Pilates in elderly women, our results also suggest that a sedentary life style may contribute to the deterioration of items related to QOL, given that the women in the CG showed decreases for FC and PA. Research conducted in many countries, including Brazil, have shown that a sedentary life style has negative effects on the health and wellbeing of individuals because lack of activity is a predisposing factor (Nahas, 2010).

This study had its limitations. For example, there was no control over some variables that may influence the perception of QOL, such as sleep quality, economic conditions, motivation etc. Furthermore, because it was a longitudinal study, four elderly women withdrew, three in the PG and one in the CG.

We believe that studies of this nature may contribute to the development of Pilates programs for elderly people and those with a sedentary life style. Thus, it is suggested that further studies be undertaken on older age groups with a longer term of observation, allowing a more detailed view on the beneficial effects of Pilates during the aging process.

5. Conclusion

In conclusion, this study supports the findings in the current literature that show the positive effect of Pilates for improving the QOL in different populations, especially in elderly people.

Practising Pilates twice a week for 30 min over a six-month period can significantly improve QOL in elderly women. Furthermore, there was a deterioration in FC and PA in the group of women who remained sedentary, showing that exercise is not only important for improvements in QOL in this age range, but also prevention of deterioration. We suggest that Pilates is incorporated as an intervention strategy in geriatric physiotherapy to improve QOL in the elderly population.

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