

Qigong for mental health and sleep quality in postmenopausal women

A randomized controlled trial

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Abstract

Background: Menopause is one of the stages in a woman's life that affects her psychological health, the most frequent being anxiety and depression. In addition, another problem related to this stage is the lack of sleep that causes a decrease in the quality of sleep. The purpose of this randomized controlled trial was to analyze the effectiveness of a Qigong exercise program on sleep quality, anxiety, and depression in Spanish postmenopausal women.

Methods: A total of 125 women were randomly assigned to an experimental group (EG) (n = 63) that carried out a Qigong exercise program for 12 weeks, or a control group (CG) (n = 62), which did not perform any type of intervention. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) and anxiety and depression using the Hospital Anxiety and Depression Scale (HADS).

Results: Women who underwent an intervention program experienced significant improvements for all measured variables, except for the use of sleeping medication and daytime dysfunctions that did not show any significant effect with respect to the group and group × time interaction.

Conclusions: After an intervention based on a BaDuanJin Qigong exercise program for 12 weeks, improvements were observed in sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, the total score of the PSQI, anxiety and depression in postmenopausal Spanish women.

Abbreviations: CG = control group, EG = experimental group, HADS = Hospital anxiety and depression scale, PSQI = Pittsburgh sleep quality index.

Keywords: anxiety, depression, postmenopausal women, Qigong, sleep quality

1. Introduction

From 2000 to 2010, the number of women in the expected age range to transition to menopause increased by 26.6%.^[1] Worldwide, it is estimated that, by 2025, there will be 1.1 billion postmenopausal women. Today, with increased life expectancy, women live a third of their lives after menopause, with some reduced menopausal symptoms for many years.^[2] It has been shown that during menopause, women have a higher number of negative life events, low self-esteem, and worse quality of life compared to men. This leads women to experience a series of changes or alterations that negatively

affect their mental health,^[3] with the most common at this stage being a high prevalence of anxiety, deterioration in the quality of life, vasomotor symptoms,^[4] and clinically relevant depression since it can be diagnosed in approximately 50% of women who seek medical advice in view of climacteric symptoms.^[5]

Similarly, one of the most common problems during menopause is lack of sleep. Approximately 40% to 60% of menopausal women present symptoms related to sleep, the most common complaint being nocturnal awakenings.^[6] Sleep problems peak in late perimenopause and continue into postmenopause.^[7] Likewise, the chances of suffering from severe sleep

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The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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difficulties increases between 2 and 3.5 times during the transition to menopause.^[8] Moreover, poor quality of sleep reduces the quality of life in general and is associated with a series of both physical and psychological problems.^[9,10]

Faced with these menopause-related symptoms, physical exercise is one of the most comprehensive strategies, as it has multiple health benefits and minimal side effects.^[11] Furthermore, in menopausal women, physical exercise is associated with lower rates of physical and mental deterioration and a significant decrease in mortality.^[12] Among these strategies, the most well-known are mind–body practices, among which Pilates and Qigong stand out.^[13] The latter is an ancient Chinese body practice that is based on the work and movement of bodily energy^[14] and its main purpose is to improve physical and mental well-being, 1 of the 4 pillars of traditional Chinese medicine.^[15] This exercise program is characterized by its flexibility and variation in intensity and duration, making it easily adaptable for all ages.^[16] Furthermore, physical exercises involve the coordination of body and limb movements that seek a harmonious interaction between posture and symmetrical physical movement, the mind, and respiratory exercise, which helps control stress and improve psychological well-being.^[17] However, there are

few randomized controlled studies that have studied the benefits of this type of exercise program in older women.

Taking the above into account, the main objective of this study was to investigate the effects of a Qigong exercise program on anxiety, depression, and quality of sleep in Spanish postmenopausal women. We hypothesize that Qigong exercises can improve anxiety, depression and the quality of sleep in postmenopausal Spanish women.

2. Materials and Methods

2.1. Study design and participants

A total of 132 women were contacted at the beginning of the study in various associations in the city of Jaén, of which 125 met the inclusion criteria and participated in the study (Fig. 1). For the inclusion criteria, the women had to: present amenorrhea for at least 12 months, be able to understand and carry out the instructions, activities, and protocols related to the Qigong exercise program; be able to understand and complete each of the prescribed self-administered questionnaires, as well as perform the necessary tests to obtain the variables of this study. The

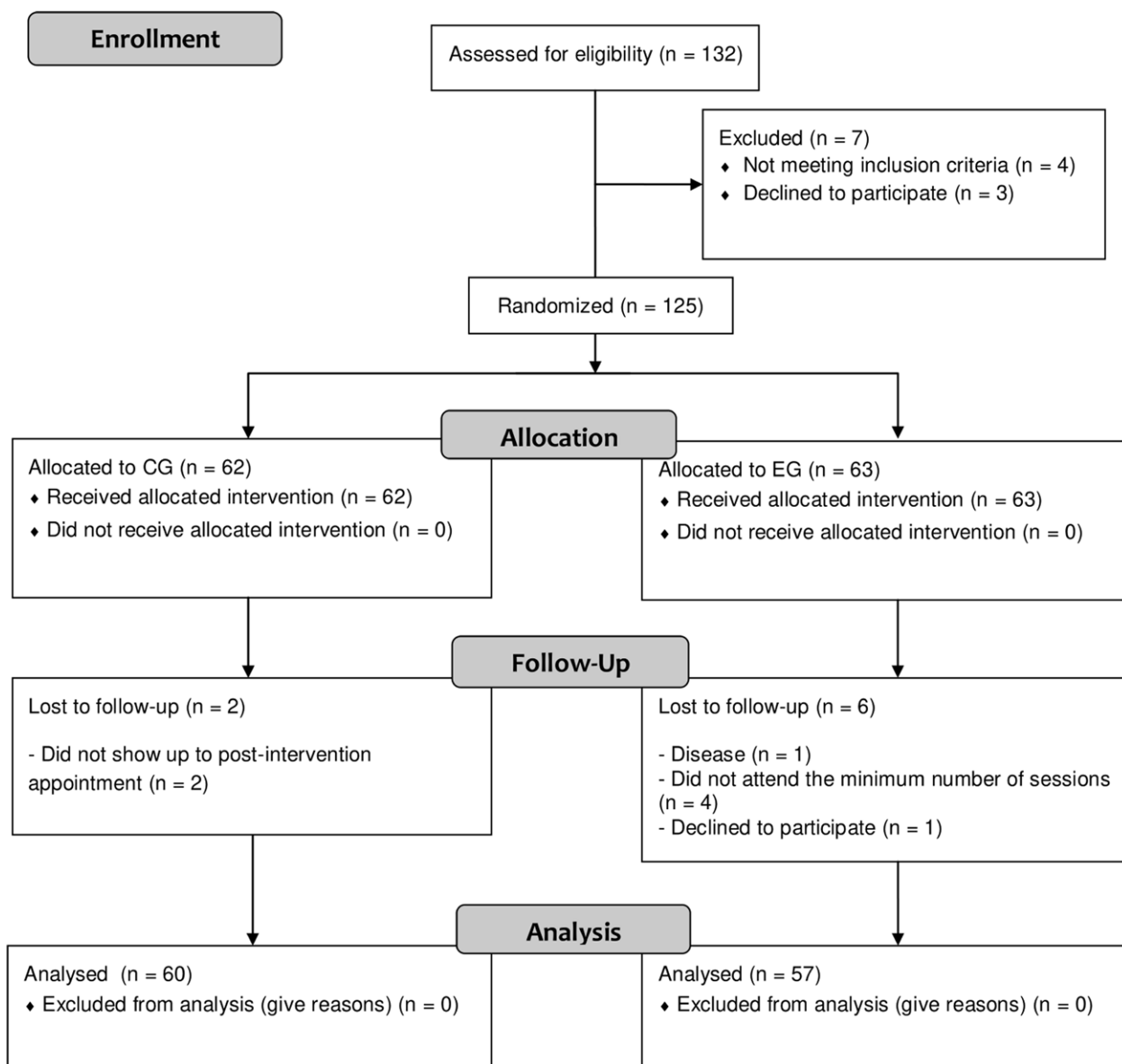


Figure 1. Flow diagram of the study participants.

exclusion criteria included: being under menopausal hormone therapy; suffering from some type of systemic disease (e.g., neurodegenerative, musculoskeletal, or vision) that prevents the performance of the postural balance test or the exercises of the Qigong program; presenting some type of vestibular disorder or disease; taking drugs that affect the central nervous system, balance, or coordination (e.g., antidepressants, vestibular sedatives, or anxiolytics). Before commencing the study, all participants signed informed consent forms in accordance with the Declaration of Helsinki, good clinical practice, and applicable laws and regulations the approval of the Human Ethics Committee of the University of Jaén (MAY.19/ 6.TES). Also, the study was registered (<https://clinicaltrials.gov/ct2/show/NCT03989453>).

2.2. Randomization

Participants were randomly assigned to a control group (CG) or an experimental group (EG) in a 1:1 ratio using a computerized table of numbers. The assignments were kept in sealed opaque envelopes that were opened by an independent party that participated in the selection of the participants. A total of 62 women were assigned to the CG and 63 to the EG.

2.3. Intervention

The intervention consisted of an exercise program based on BaDuanJin Qigong for 2 60-minute sessions per week, with a total of 24 sessions, lasting 12 weeks. Each of the sessions carried out during this period consisted of a total of 3 well-differentiated parts: a 10-minute warm-up part in which breathing exercises and joint mobility were performed to improve range of motion and reduce muscle and bone injuries; a 40-minute Qigong training part, consisting of a total of 10 postures known as the “eight pieces of brocade” preparation posture; “Shuang Shou Tuo Tian Li San Jiao”; “Zuo You Kai Gong Si She Diao”; “Tiao Li Pi Wei Xu Dan Ju”; “Wu Lao Qi Shang Wang Hou Qiao”; “Yao Tou Bai Wei Qu Xin Huo”; “Liang Shou Pan Zu Gu Shen Yao”; “Cuan Quan Nu Mu Zeng Qi Li”; “Bei Hou Qi Dian Bai Bing Xiao”; final position; a 10-minute cooling-down part, in which flexibility exercises and stretching were performed.

On the other hand, the women corresponding to the CG maintained their daily activities and did not participate in any exercise program. However, they were provided with some recommendations for the promotion of physical activity: https://www.sanidad.gob.es/profesionales/saludPublica/prevPromocion/Estrategia/docs/Recomendaciones_ActivFisica_para_la_Salud.pdf

2.4. Outcomes

All data obtained during this study were collected both at the beginning of the re-search and after the intervention period. Socio-demographic and clinical data such as age, years since menopause, marital status, occupational status, and educational level were collected. For the evaluation of body mass index, the participant’s weight (kg) was divided by their height squared (m^2).

2.4.1. Sleep quality. To evaluate sleep quality, the Pittsburgh Sleep Quality Index (PSQI) questionnaire was used,^[11,18] one of the most used tools for this purpose. The PSQI consists of 19 questions or self-assessing items and 5 more that must be completed by the person with whom the participant shares a bed or room (although the latter is only used to provide clinical information). These items generate a total score and 7 components or domains: sleep quality; sleep latency; sleep duration; sleep efficiency; sleep disturbances; use of sleeping

medication; daytime dysfunction. The total PSQI score ranges from 0 to 21, where a higher score indicates poorer sleep quality.

2.4.2. Anxiety and depression. The Hospital Anxiety and Depression Scale (HADS) was used to assess the magnitude of anxiety symptoms and depression.^[19,20] This questionnaire is widely used in non-institutionalized older people, and more specifically in postmenopausal women.^[21] Moreover, it consists of 14 items, of which 7 are focused on anxiety (odd questions) and 7 on depression (even questions). Each item is scored from 0 to 3 and the total score for both anxiety and depression ranges from 0 to 21, where a higher score represents a greater burden of symptoms.

2.5. Sample size calculation

Considering that depression and sleep disturbances in postmenopausal women have a prevalence of 40%,^[22,23] proportion in the reference group is taken as 0.4 with 80% power at a significance level of 0,05 (IC 95%), a statistical power of 80% and an expected loss rate of 15%, the sample size adjusted for losses is 107 participants.

2.6. Statistical analysis

All statistical analyses were performed with the SPSS statistical program, version 20.0, for Windows (SPSS, Inc., Chicago, IL). Statistical significance was determined at $P < .05$. The results of this study were presented as the means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. The Kolmogorov–Smirnov test was used to assess the normality of the data distribution. Student’s t and chi-square tests were used for the continuous and categorical variables, respectively, to determine the possible differences between both study groups before the study began. A mixed analysis of variance was carried out to analyze any differences in values between the studied variables, in which the study group was considered the inter-group factor (CG vs EG), and the measurement time of the variables (pre- and post-intervention) the intra-group factor. The dependent variables were sleep quality (PSQI), anxiety, and depression (HADS). All analyses were carried out independently for each dependent variable and the possible interactions “group \times measurement time” was analyzed. Cohen’s d statistic was used to assess the effect size of possible inter-group and intra-group differences. Values < 0.2 indicate an insignificant effect size, between ≥ 0.2 and < 0.5 —small, between ≥ 0.5 and < 0.8 —medium, and ≥ 0.8 —large.^[24]

3. Results

Table 1 shows the characteristics of the participants at the beginning of the study, in which it can be observed that there were no significant differences between both groups. Participants attended at least 90.8% of the intervention sessions and no injuries or adverse effects were reported during the intervention.

3.1. Sleep quality

Regarding sleep quality (Table 2), in the subjective quality of sleep scores, significant differences were found within the EG: $t(56) = 3.218$, $P = .002$, Cohen’s $d = 0.23$. In addition, statistically significant differences were observed between both groups in the post-intervention measure: $t(115) = 3.748$, $P = .000$, Cohen’s $d = 0.69$. In sleep latency, the existence of statistically significant differences between the pre and post measurement was observed in the EG: $t(56) = 3.080$, $P = .003$, Cohen’s $d = 0.27$, and statistically significant differences were found between both groups in the measurement post intervention: $t(115) = 3.018$, $P = .003$, Cohen’s $d = 0.56$. Regarding sleep duration, statistically

Table 1
Baseline characteristics of study participants.

	Total (n = 117)	EG (n = 57)	CG (n = 60)	P value
Age (yrs)	69.73 ± 6.44	69.70 ± 6.15	69.75 ± 6.76	.968
Yrs since menopause	19.42 ± 6.88	19.65 ± 6.70	19.20 ± 7.09	.726
BMI	26.83 ± 2.53	27.15 ± 2.67	26.53 ± 2.38	.187
Occupation				.362
	Retired	35 (52.20)	32 (47.80)	
	Worker	15 (45.50)	18 (54.50)	
	Unemployed	7 (41.20)	10 (58.80)	
Marital status				.824
	Single	7 (50.0)	7 (50.0)	
	Married/cohabiting	33 (47.10)	37 (52.90)	
	Separated/divorced/ Widowed	17 (51.5)	16 (48.5)	
Education				.125
	No formal education	9 (56.20)	7 (43.80)	
	Primary education	40 (53.30)	35 (46.70)	
	Secondary education	4 (23.50)	13 (76.50)	
	University	4 (44.40)	5 (55.60)	
PSQI				
	Sleep quality	1.07 ± 1.03	1.37 ± 0.84	.091
	Sleep latency	1.25 ± 1.20	1.45 ± 1.24	.367
	Sleep duration	0.88 ± 0.89	0.82 ± 0.91	.717
	Sleep efficiency	0.61 ± 0.77	0.72 ± 1.03	.544
	Sleep disturbances	1.35 ± 0.48	1.37 ± 0.49	.860
	Use of sleeping medication	1.30 ± 1.27	1.52 ± 1.07	.314
	Daytime dysfunction	1.11 ± 0.75	1.32 ± 0.60	.093
	Total score	7.56 ± 4.56	8.55 ± 3.31	.181
HADS				
	Anxiety	6.84 ± 3.81	8.22 ± 4.81	.091
	Depression	8.53 ± 3.52	9.57 ± 3.24	.099

Data are expressed as mean and standard deviation. Qualitative variables are presented as frequency and percentage. BMI = body mass index, CG = control group, EG = experimental group, HADS: hospital anxiety and depression scale, PSQI = Pittsburgh Sleep Quality Scale.

significant differences could be observed between the pre and post measurements in the Qigong treatment/training group: $t(56) = 4.514, P = .000$, Cohen's $d = 0.50$. Likewise, statistically significant differences between both groups was observed in the post-intervention measure: $t(115) = 3.178, P = .002$, Cohen's $d = 0.59$. In sleep latency, statistically significant differences were shown between the pre and post measurements in the GE: $t(56) = 2.921, P = .005$, Cohen's $d = 0.34$, and statistically significant differences between both groups in the post-intervention measure: $t(115) = 4.094, P = .000$, Cohen's $d = 0.75$.

Likewise, for sleep disturbances, statistically significant differences were observed between the pre and post measurement in the GE group: $t(56) = 4.675, P = .000$, Cohen's $d = 0.73$ and statistically significant differences between both groups in the post measurement intervention: $t(115) = 4.092, P = .000$, Cohen's $d = 0.90$. Finally, in the PSQI total score, statistically significant differences between the pre and post measurement were observed in the treatment/Qigong training group: $t(56) = 7.671, P = .000$, Cohen's $d = 0.40$, and statistically significant differences between both groups in the post-intervention measure: $t(115) = 4.780, P = .000$, Cohen's $d = 0.88$. In contrast, the use of sleeping medication and daytime dysfunctions did not show any significant main effect with respect to group and group × time interaction.

3.2. Anxiety and depression

Table 2 shows the main effects of the Qigong program on anxiety and depression. According to our findings, in anxiety, statistically significant differences were found between the pre and post measurement in the Qigong treatment/training group: $t(56) = 3.058, P = .003$, Cohen's $d = 0.32$, and statistically significant differences between both groups in the post-intervention measure: $t(115) = 4.012, P = .000$, Cohen's $d = 0.74$. Regarding depression, statistically significant differences were observed between the pre and post measurement in the EG: $t(56) = 2.844, P = .006$, Cohen's $d = 0.25$. In addition, statistically significant differences between both groups were demonstrated in the post-intervention measure: $t(115) = 4.006, P = .000$, Cohen's $d = 0.74$.

4. Discussion

The present work aimed to study the effects of a Qigong exercise program on anxiety, depression, and quality of sleep in Spanish postmenopausal women. The results showed that a Qigong program is effective in improving anxiety, depression, and sleep quality in postmenopausal women.

Currently, sleep problems impact most of the general population. However, menopausal women in particular are more impacted. About 50% of postmenopausal women suffer from sleep disorders that negatively affect their quality of life.^[25] In relation to the aforementioned, Moline et al^[26] carried out a review in which they determined that sleep problems are the most frequent complaint among peri- and postmenopausal women, caused mainly by vasomotor symptoms, breathing problems during sleep, and emotional problems. Currently, different therapeutic methods such as drugs have been used for treatment, but due to their side effects, non-pharmacological interventions such as physical exercise have been recommended, since physical activity has positive effects on women's health, particularly in postmenopausal women.^[27] Furthermore, a low level of physical exercise has been shown to be an independent risk factor for poor sleep quality in postmenopausal women.^[28] In the present randomized control trial, the Pittsburgh Sleep Quality Index, an instrument of easy application and good validity, was used to assess sleep quality.^[11] Across the entire sample, the total PSQI score showed a mean value of $7.50 ± 3.87$, which translates into poor sleep quality. These results are similar to a study by Hita-Contreras et al, which obtained a mean value of $7.52 ± 4.00$ from the total PSQI score.^[10] However, a study by Casas et al showed lower mean values than our study ($6.1 ± 2.4$) in a population older than 60 years.^[29] Despite these differences, both datasets show poor sleep quality in postmenopausal women. Our results showed improvements after 12 weeks of BaDuanJin training in the PSQI total score, as well as in the subjective sleep quality, sleep latency, sleep duration, sleep efficiency, and sleep disturbance domains. Similarly, studies by Yeh et al also reported the effects of Chi Kung on sleep quality, but using another modality to that of our study, Ping Shuai, and only found significant improvements in sleep latency, habitual sleep efficiency, and sleep disturbance.^[16]

Table 2
Effects of Qigong training on sleep quality, anxiety and depression.

	Pre-intervention		Post-intervention		Group			Time			Group × Time				
	EG	CG	EG	CG	F (1,115)	P value	η ²	F (1,115)	P value	η ²	F (1,115)	P value	η ²		
PSQI	Sleep quality	1.07 ± 1.03	1.37 ± 0.84	0.84 ± 0.96	1.45 ± 0.79	7.866	.006	0.064	2.3000	.132	0.020	10.646	.001	0.085	
	Sleep latency	1.25 ± 1.20	1.45 ± 1.24	0.95 ± 0.99	1.57 ± 1.21	4.225	.042	0.035	1.287	.259	0.011	6.720	.011	0.055	
	Sleep duration	0.88 ± 0.89	0.82 ± 0.91	0.51 ± 0.57	0.93 ± 0.84	1.722	.192	0.015	4.490	.036	0.038	16.671	.000	0.127	
	Sleep efficiency	0.61 ± 0.77	0.72 ± 1.03	0.37 ± 0.62	0.90 ± 0.78	5.849	.017	0.048	0.177	.674	0.002	8.410	.004	0.068	
	Sleep disturbances	1.35 ± 0.48	1.37 ± 0.49	1.07 ± 0.26	1.43 ± 0.50	6.946	.010	0.057	7.250	.008	0.059	19.095	.000	0.142	
	Use of sleeping medication	1.30 ± 1.27	1.52 ± 1.07	1.12 ± 1.18	1.47 ± 1.11	1.823	.180	0.016	5.162	.025	0.430	1.598	.209	0.014	
	Daytime dysfunction	1.11 ± 0.75	1.32 ± 0.60	1.04 ± 0.78	1.28 ± 0.69	3.362	.069	0.028	2.040	.156	0.017	0.258	.612	0.002	
	Total score	7.56 ± 4.56	8.55 ± 3.31	5.89 ± 3.74	9.03 ± 3.36	9.325	.003	0.075	12.269	.001	0.096	40.502	.000	0.260	
	HADS	Anxiety	6.84 ± 3.81	8.22 ± 4.81	5.68 ± 3.53	8.83 ± 4.83	9.093	.003	0.073	1.052	.357	0.009	11.312	.001	0.090
		Depression	8.53 ± 3.52	9.57 ± 3.24	7.70 ± 3.23	10.07 ± 3.16	9.095	.003	0.073	0.518	.473	0.004	8.632	.004	0.070

Data are presented as mean and standard deviation.

CG = control group, EG = experimental group, HADS = hospital anxiety and depression scale, PSQI = Pittsburgh Sleep Quality Scale.

With regard to BaDuanJin, previous studies have been found, but focused on older adults of both sexes, such as a study by Chen et al,^[30] which demonstrated that a BaDuanJin exercise program improved the general quality of sleep, the subjective quality of sleep, sleep latency, sleep duration, sleep efficiency, and daytime dysfunction for 12 weeks. Furthermore, Feng et al^[31] found significant improvements in the general quality of sleep in a group that participated in a BaDuanJin program, and Zou et al,^[32] in which the authors showed a significant benefit of BaDuanJin exercise to improve the general quality of sleep in people with chronic diseases and pathologies. Lastly, a study by Lu et al^[33] observed significant improvements in overall sleep quality in colon cancer patients undergoing chemotherapy for 24 weeks.

Although no previous studies have focused on the effect of BaDuanJin exercise on sleep quality in postmenopausal women, other exercise programs have been shown to improve sleep quality, such as the study by Halpern et al,^[34] in which the EG was subjected to yoga training for 12 weeks, which showed an improvement in the quality of sleep, measured with the PSQI questionnaire. A randomized controlled clinical trial found that the group that carried out exercise-based training on a treadmill or elliptical trainer for 12 weeks showed greater improvement in the PSQI domains of the symptoms of insomnia and in the subjective quality of insomnia sleep compared to a CG.^[35] Tworoger et al examined the effects of a stretching exercise intervention on sleep quality, and results showed that the group of women who carried out the intervention showed significant improvements in sleep quality compared to a CG.^[36] Therefore, the practice of BaDuanJin exercise joins a growing list of exercises that improve sleep quality in postmenopausal women.

Menopause is closely related to high levels of anxiety. Older women have higher levels of anxiety than men, as the menopausal period causes a series of hormonal changes that affect women's psychological state, producing emotional wear.^[37] That is why it is necessary to use different methods for menopause treatment, among which physical exercise stands out. A recent meta-analysis concluded that scheduled low to moderate intensity exercise for at least 6 weeks appears to improve mild to moderate anxiety symptoms in middle-aged and elderly women.^[38] In the present study, the HADS, a tool of easy application and good validity, was used to assess anxiety and depression.^[39] Regarding the Chi Kung training program, significant decreases in anxiety symptoms have been shown in women with breast cancer after performing a Guolin-Qigong modality intervention for 24 weeks.^[40] Another study showed significant

improvements in anxiety after 9 weeks of BaDuanJin exercises, but this was conducted in a sample of women with chronic fatigue syndrome-like symptoms.^[41] However, in another study that examined the effects of another Chi Kung exercise called Wu Xing Ping Heng Gong, the results showed no improvement in anxiety symptoms in patients with chronic fatigue syndrome.^[42] Our results showed that women who enrolled in the BaDuanJin program experienced an improvement in anxiety after the intervention period compared to the CG. Likewise, Chow et al showed that 12 weeks of Chi Kung training in middle-aged adults had positive effects on reducing stress and anxiety.^[43]

Depression is one of the most frequent and debilitating psychological problems in postmenopausal women, with a considerable impact on their economic, social, and personal well-being.^[44] Exercise has been included in some clinical guidelines as a complementary method for the treatment of major depressive disorder,^[45] and a recent meta-analysis supports exercise as a complementary lifestyle change that improves overall health, including a reduction in depressive symptoms in middle-aged and older women.^[46] Our findings revealed that a 12-week BaDuanJin training program improved depression, as measured by the HADS questionnaire. Similarly, Jiao et al verified the effects of BaDuanJin exercise training for 12 weeks on depression. The results showed significant improvements in depressive symptoms in the intervention group, as measured by the Beck depression inventory.^[47] However, and unlike in our work, their study involved a sample comprising people with fibromyalgia.

Similarly, several studies have shown improvements in depression, but only after performing other types of physical training. One study conducted a randomized controlled clinical trial in a population of postmenopausal women and observed improvements in depression after a 12-week Pilates training program.^[48] Jorge et al found a beneficial effect on depression after a 12-week yoga training program.^[49] Moreover, Abedi et al showed that the intensity of depression decreased in a 12-week pedometer-based gait training intervention group compared to the CG.^[50] Finally, Villaverde et al found improvements in depression, measured by the Yesavage Scale, after an intervention based on aerobic exercises in postmenopausal women.^[51]

Likewise, currently, there is a new concept known as depreobesity, which is defined as the impact of depression on obesity because this state pushes people to consume unhealthy foods with many calories to improve their mood and thus gain weight easily.^[52] Physical exercise in general is an essential strategy for

reducing these symptoms, as reflected in the previous paragraphs, and specifically Qigong has shown benefits both in depression^[47] and in body composition^[53,54] in older people, although taking into account the novelty of this concept, new studies are needed to study the benefits of physical exercise in depreobesity.

This study has a series of limitations. Firstly, only short-term effects were evaluated; moreover, the study was carried out with women who live in the community, so, in general, the findings cannot be extended to the elderly. In addition, due to the nature of the study, the participants were not blinded to the intervention; however, they were blinded to the hypotheses. Therefore, it is necessary to carry out future studies that measure the long-term effects in older people and, in particular, older women.

5. Conclusions

The present study showed that a 12-week Qigong-based exercise program has beneficial effects on anxiety and depression, as measured by the HADS. Likewise, based on the PSQI, improvements in the sleep quality of Spanish postmenopausal women were evaluated. Importantly, Qigong exercise training can be a fundamental strategy to improve the health of older women, so greater emphasis is needed in future research on the effects of physical exercise on both physical and psychological functioning of postmenopausal women. Also, due to the emergence of new terms, more studies should be carried out to verify the effects of Qigong on these symptoms not only in older women but also in older adults in general.

Author contributions

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References

- [1] Howden LM, Meyer JA. Age and sex composition: 2010. United States Census Bureau; 2011. Available at: www.census.gov/prod/cen2010/briefs/c2010br-03.pdf.
- [2] Cintron D, Lipford M, Larrea-Mantilla L, et al. Efficacy of menopausal hormone therapy on sleep quality: systematic review and meta-analysis. *Endocrine*. 2017;55:702–11.
- [3] García-Campayo J, Lou-Arnal S. Trastornos afectivos y género. *Claves en Salud Mental*. 2006;6:1–6.
- [4] Bryant C, Judd FK, Hickey M. Anxiety during the menopausal transition: a systematic review. *J Affect Disord*. 2012;139:141–8.
- [5] Mohammed-Ali A, Hassan-Ahmed A, Smail L. Psychological climacteric symptoms and attitudes toward menopause among emirati women. *Int J Environ Res Public Health*. 2020;17:5028.
- [6] Freedman RR. Menopause and sleep. *Menopause*. 2014;21:534–5.
- [7] Polo-Kantola P. Sleep disturbances at the menopause. *Maturitas*. 2015;22:899–915.
- [8] Tom SE, Kuh D, Guralnik JM, et al. Self-reported sleep difficulty during the menopausal transition: results from a prospective cohort study. *Menopause*. 2010;17:1128–35.
- [9] Goldman SE, Stone KL, Ancoli-Israel S, et al. Poor sleep is associated with poorer physical performance and greater functional limitations in older women. *Sleep*. 2007;30:1317–24.

- [10] Hita-Contreras F, Zagalaz-Anula N, Martínez-Amat A, et al. Sleep quality and its association with postural stability and fear of falling among Spanish postmenopausal women. *Menopause* 2018;2:62–9.
- [11] Hita-Contreras F, Martínez-López E, Latorre-Román PA, et al. Reliability and validity of the Spanish version of the Pittsburgh Sleep Quality Index (PSQI) in patients with fibromyalgia. *Rheumatol Int*. 2014;34:929–36.
- [12] Anderson D, Seib C, Rasmussen L. Can physical activity prevent physical and cognitive decline in postmenopausal women? A systematic review of the literature. *Maturitas*. 2014;79:14–33.
- [13] Innes KE, Selfe TK, Vishnu A. Mind-body therapies for menopausal symptoms: a systematic review. *Maturitas*. 2010;66:135–49.
- [14] Bai XN. The old four and the new five sets of Qigong exercise on health care. *Self-Care*. 2015;8:38–9.
- [15] Chang PS, Knobf T, Oh B, et al. Physical and psychological health outcomes of qigong exercise in older adults: a systematic review and meta-analysis. *Am J Chin Med*. 2019;47:301–22.
- [16] Yeh SC, Chang MY. The effect of Qigong on menopausal symptoms and quality of sleep for perimenopausal women: a preliminary observational study. *J Altern Complement Med*. 2012;18:567–75.
- [17] Zou L, SasaKi JE, Wang H, et al. Systematic review and meta-analysis baduanjin qigong for health benefits: randomized controlled trials. *Evid Based Complement Alternat Med*. 2017;2017:4548706.
- [18] Buysse DJ, Reynolds CF, Monk TH, et al. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28:193–213.
- [19] Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand*. 1983;67:361–70.
- [20] Herrero MJ, Blanch J, Peri JM, et al. Validation study of the hospital anxiety and depression scale (HADS) in a Spanish population. *Gen Hosp Psychiatry*. 2003;25:277–83.
- [21] Zagalaz-Anula N, Hita-Contreras F, Martínez-Amat A, et al. The associations between menopausal symptoms and sleep quality in Spanish postmenopausal women. *Climacteric*. 2019;22:511–7.
- [22] Woods NF, Mariella A, Mitchell ES. Patterns of depressed mood across the menopausal transition: approaches to studying patterns in longitudinal data. *Acta Obstet Gynecol Scand*. 2002;81:623–32.
- [23] Moe KE. Hot flushes and sleep in women. *Sleep Med Rev*. 2004;8:487–97.
- [24] Cohen JA. power primer. *Psychol Bull*. 1992;112:155–9.
- [25] Rasuli F, Hagihamiri P. Mental health problems in postmenopausal women. *Life Magazine*. 2004;20:4–16.
- [26] Moline ML, Broch L, Zak R, et al. Sleep in women across the life cycle from adulthood through menopause. *Sleep Med Rev*. 2003;7:155–77.
- [27] Daley A, Stokes-Lampard H, Thomas A, et al. Exercise for vasomotor menopausal symptoms. *Cochrane Database Syst Rev*. 2014;28:CD006108.
- [28] Moudi A, Dashtgard A, Salehiniya H, et al. The relationship between health-promoting lifestyle and sleep quality in postmenopausal women. *Biomedicine (Taipei)*. 2018;8:11.
- [29] Casas RS, Pettee Gabriel KK, Kriska AM, et al. Association of leisure physical activity and sleep with cardiovascular risk factors in postmenopausal women. *Menopause*. 2012;19:413–9.
- [30] Chen MC, Liu HE, Huang HY, et al. The effect of a simple traditional exercise programme (Baduanjin exercise) on sleep quality of older adults: a randomized controlled trial. *Int J Nurs Stud*. 2012;49:265–73.
- [31] Feng F, Tuchman S, Denninger JW, et al. Qigong for the prevention, treatment, and rehabilitation of COVID-19 infection in older adults. *Am J Geriatr Psychiatry*. 2020;28:812–9.
- [32] Zou L, Sasaki JE, Wei GX, et al. Effects of mind-body exercises (Tai Chi/Yoga) on heart rate variability parameters and perceived stress: a systematic review with meta-analysis of randomized controlled trials. *J Clin Med*. 2018;7:404.
- [33] Lu Y, Qu HQ, Chen FY, et al. Effect of baduanjin qigong exercise on cancer-related fatigue in patients with colorectal cancer undergoing chemotherapy: a randomized controlled trial. *Oncol Res Treat*. 2019;42:431–9.
- [34] Halpern J, Cohen M, Kennedy G, et al. Yoga for improving sleep quality and quality of life for older adults. *Altern Ther Health Med*. 2014;2:37–46.
- [35] Sternfeld B, Guthrie KA, Ensrud KE, et al. Efficacy of exercise for menopausal symptoms: a randomized controlled trial. *Menopause*. 2014;21:330–8.
- [36] Tworoger SS, Yasui Y, Vitiello MV, et al. Effects of a yearlong moderate-intensity exercise and a stretching intervention on sleep quality in postmenopausal women. *Sleep*. 2003;26:830–6.

- [37] Cohen LS, Soares CN, Vitonis AF, et al. Risk for new onset of depression during the menopausal transition: the Harvard study of moods and cycles. *Arch Gen Psychiatry*. 2006;63:385–90.
- [38] Martínez-Domínguez SJ, Lajusticia H, Chedraui P, et al. Health outcomes and systematic analyses (HOUSSAY) project. The effect of programmed exercise over anxiety symptoms in midlife and older women: a meta-analysis of randomized controlled trials. *Climacteric*. 2018;21:123–31.
- [39] Asbury E, Collins P, Chandruangphen P. The importance of continued exercise participation in quality of life and psychological well-being in previously inactive postmenopausal women: a pilot study. *Menopause*. 2006;13:561–7.
- [40] Liu P, You J, Loo WTY, et al. The efficacy of Guolin-Qigong on the body-mind health of Chinese women with breast cancer: a randomized controlled trial. *Qual Life Res*. 2017;26:2321–31.
- [41] Chan JS, Ho RT, Chung KF, et al. Qigong exercise alleviates fatigue, anxiety, and depressive symptoms, improves sleep quality, and shortens sleep latency in persons with chronic fatigue syndrome-like illness. *Evid Based Complement Alternat Med*. 2014;2014:106048.
- [42] Chan JS, Ho RT, Wang CW, et al. Effects of qigong exercise on fatigue, anxiety, and depressive symptoms of patients with chronic fatigue syndrome-like illness: a randomized controlled trial. *Evid Based Complement Alternat Med*. 2013;2013:485341.
- [43] Chow Y, Siu A. The effects of qigong on reducing stress and anxiety and enhancing body-mind well-being. *Midfulness*. 2011;3:51–9.
- [44] Mulhall S, Andel R, Anstey KJ. Variation in symptoms of depression and anxiety in midlife women by menopausal status. *Maturitas*. 2018;108:7–12.
- [45] Ravindran AV, Balneaves LG, Faulkner G, et al. Canadian network for mood and anxiety treatments (CANMAT). Clinical guidelines for the management of adults with major depressive disorder: section 5. complementary and alternative medicine treatments. *Can J Psychiatr. Revue canadienne de psychiatrie*. 2016;61:576–87.
- [46] Pérez-López FR, Martínez-Domínguez SJ, Lajusticia H, et al. Health outcomes systematic analyses project. Effects of programmed exercise on depressive symptoms in midlife and older women: a meta-analysis of randomized controlled trials. *Maturitas*. 2017;106:38–47.
- [47] Jiao J, Russell IJ, Wang W, et al. Ba-Duan-Jin alleviates pain and fibromyalgia-related symptoms in patients with fibromyalgia: results of a randomized controlled trial. *Clin Exp Rheumatol*. 2019;37:953–62.
- [48] Aibar-Almazán A, Hita-Contreras F, Cruz-Díaz D, et al. Effects of Pilates training on sleep quality, anxiety, depression and fatigue in postmenopausal women: a randomized controlled trial. *Maturitas*. 2019;124:62–7.
- [49] Jorge MP, Santaella DF, Pontes IM, et al. Hatha Yoga practice decreases menopause symptoms and improves quality of life: a randomized controlled trial. *Complement Ther Med*. 2016;26:128–35.
- [50] Abedi P, Nikkiah P, Najari YS. Effect of pedometer-based walking on depression, anxiety and insomnia among postmenopausal women. *Climacteric*. 2015;18:841–5.
- [51] Villaverde Gutiérrez C, Torres Luque G, Ábalos Medina GM, et al. Influence of exercise on mood in postmenopausal women. *J Clin Nurs*. 2012;21:923–8.
- [52] Mediouni M, Kaczor-Urbanowicz KE, Madiouni R. Future epidemic: depreobesity. *Obes Med*. 2020;19:100240.
- [53] James D, Larkey LK, Evans B, et al. Pilot study of tai chi and qigong on body composition, sleep, and emotional eating in midlife/older women. *J Women Aging*. 2022;34:449–59.
- [54] Larkey LK, James D, Belyea M, et al. Body composition outcomes of tai chi and qigong practice: a systematic review and meta-analysis of randomized controlled trials. *Int J Behav Med*. 2018;25:487–501.