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Original Article

The Effect of Baduanjin Qigong on Impact of Disease and Sleep Quality in Elderly Fibromyalgia Patients

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A B S T R A C T

Introduction: Fibromyalgia is marked by widespread chronic pain, fatigue, and disrupted sleep, significantly impacting quality of life. This study aimed to explore the effect of Baduanjin Qigong (BQ) on impact of the disease and quality of sleep in elderly patients with fibromyalgia.

Methods: The study employed a semi-experimental design. A total of thirty-four elderly female patients with fibromyalgia were recruited through convenience sampling and allocated into two intervention groups: BQ group (n = 17) and a walking group (n = 17). The BQ protocol was conducted for 12 weeks, with sessions held three times a week. The walking group participated in a 12 week fitness walking program. Impact of the disease and quality of sleep were assessed at baseline and after 12 weeks using The Revised Fibromyalgia Impact Questionnaire (FIQR) and the Pittsburgh Sleep Quality Index (PSQI). Data were analyzed using paired t-test and independent t-test.

Results: The significant improvements were observed in PSQI total ($t(16) = 3.65$, $p = 0.002$), FIQR ($t(16) = 3.76$, $p = 0.002$), FIQR function ($t(16) = 2.16$, $p = 0.04$), FIQR symptoms ($t(16) = 2.957$, $p = 0.009$) in BQ group. There was a significant difference between the average post-test data of the walking group and BQ group in daytime dysfunction, with the BQ group performing better than the walking group ($p \leq 0.05$).

Conclusion: BQ significantly improves fibromyalgia impact and sleep quality in elderly patients and reduces daytime dysfunction more effectively than walking. However, it is not superior to walking in other aspects of disease impact and sleep quality enhancement.

Keywords: Baduanjin Qigong, Fibromyalgia, Mind-Body Therapies, Aged, Sleep Quality

Introduction

Fibromyalgia syndrome (FMS) is a musculoskeletal disorder in adults that causes pain and stiffness in muscles, tendons, and joints and is associated with morning sickness, anxiety, depression, chronic fatigue, and gastrointestinal disorders (1). FMS affects approximately 1 to 3% of the general population and is more common among women and older adults (2). The most common symptoms of fibromyalgia (FM) include widespread chronic pain, persistent fatigue, and disrupted sleep

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patterns, which can significantly limit a person's quality of life (3). To date, the cause of FM is unknown. Common treatments include the use of antidepressants (selective serotonin reuptake inhibitors) as well as selective pain relievers and analgesics (4). However, there are significant side effects associated with a number of these pharmacological approaches, and the therapeutic benefits are few and short-term (5). This indicates that managing this condition should involve addressing sleep disturbances through interventions (6). With the popularity of mind-body interventions in a variety of diseases and conditions, in the last ten years, the effectiveness of Qigong for the management of FM symptoms has been investigated (7).

Mind-body therapies are a group of interventions that are based on the premise that the relationship between mind and body can positively affect a person's overall health (8). Qigong is a mind-body intervention based on Chinese martial arts and meditative movements. It consists of a series of dynamic and static postures that are performed through uniform and continuous body movements along with breathing (9). Health Qigong includes Yijinjing, Wuqinxi, Liuzijue and Baduanjin (10). Baduanjin is one of the Chinese non-drug treatment methods. The benefits of these treatments are through body adjustments, heart regulation, breathing regulation, motor function regulation, balance, coordination ability and general resistance of patients against disease and rehabilitation ability at different levels and angles (11). The characteristics of these treatments also include less side effects and high clinical acceptance, which are widely used in the prevention and treatment of diseases. Therefore, an increasing number of studies have focused on non-pharmacological Chinese therapies. Previous research has demonstrated that Baduanjin is effective in reducing the pain levels and overall quality of life among elderly individuals (12-14). Furthermore, it has been shown to lessen the impact of FM, enhance sleep quality (15), and alleviate symptoms associated with the condition (16).

Older adults often have a lower tolerance for vigorous physical exercise and tend to be less active compared to their non-frail counterparts. Therefore, when recommending an exercise program for older adults, it is crucial to consider factors such as acceptability, tolerability, and safety to ensure their participation and enjoyment (12). Baduanjin Qigong (BQ), a simple and gentle exercise, is an ancient Eastern non-pharmacological therapy. It is easy to learn and perform, featuring slow, relaxed movements designed to promote physical and mental well-being rather than focusing on combat or self-defense (17). The authors hypothesized that it could be an ideal non-pharmacological therapy for FM patients. However, no research in the country has yet investigated the effectiveness of BQ on disease impact and sleep quality in elderly FM patients. The primary aim of the current study was to investigate the effects of BQ on disease impact and sleep quality in elderly patients with FM.

Methods

Study design and participants

The study employed a semi-experimental design, incorporating pre-test and post-test evaluations. Thirty-four elderly female patients with FM were selected during a study conducted in 2023 at Dr. Vosoughian Clinic, located in Ayjan Building, Urmia, West Azerbaijan, Iran, using convenience sampling and according to the inclusion and exclusion criteria. Sample size using G*POWER3.1 software with an effect size of 0.7, $\alpha = 0.05$, statistical power 0.95 and the number of two groups, at least 26 people from this community was determined (17). Due to the possibility of dropping out, thirty-four people were considered.

The eligibility criteria for participation in this study included women between the ages of 60 and 65 years, no previous history of Qigong practice, consent to participate in the study, not having regular exercise at least in the last 6 months, obtaining a sleep quality score higher than 6 in the Pittsburgh Sleep Quality Index. Conversely, individuals were excluded from the study if they had a diagnosis of diabetes, thyroid disorders, neuropathies, or Lyme hepatitis disease (15). Other exclusion criteria included the presence of uncontrolled psychiatric conditions (18), more than three absences from the intervention sessions, a score below 23 on the Mini- Mental State Examination, and an inability to perform physical exercises.

Tools

Demographic information: age, weight, height, marital status and duration of symptoms were collected through direct inquiries to the participants.

The Mini-Mental State Examination (MMSE): a concise measure of cognitive function, was developed by Folstein et al., in 1975. Comprising 14 items, the MMSE evaluates various aspects of mental status. Scores are interpreted as follows: below 18 indicate cognitive impairment, 19 to 24 suggest borderline cognitive function, and 25 or above denote normal cognitive status (19).

Pittsburgh Sleep Quality Index (PSQI): the PSQI (20) is a self-report questionnaire that examines the quality of sleep and is the most appropriate tool for evaluating the quality of sleep in the elderly. In this 18-item normalized questionnaire, the questions are classified into seven subscales. The sum of the average scores of these seven components constitutes the total score of the tool, which ranges from 0 to 21. The higher the score, the worse the sleep quality. A score greater than 6 indicates poor sleep quality. The validity and reliability of this questionnaire has also been confirmed in Iran (21).

Impact of disease: The Revised Fibromyalgia Impact Questionnaire (FIQR), an updated version of the Fibromyalgia Impact Questionnaire (FIQ), includes 21 questions across three categories: function, impact, and symptoms. Each question is rated on an 11-point Likert scale, with 0 indicating no difficulty or problem and 10 indicating extreme difficulty, inability to perform tasks, or severe symptoms (22). The Persian version of FIQR demonstrated good reliability with a Cronbach's α of 0.87 (23).

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Procedure

Patients with FMS were diagnosed by an experienced rheumatologist based on the criteria of the American College of Rheumatology in Dr. Vosoughian Clinic. Following a briefing session about the research objectives and implementation, thirty-four elderly female patients with FM were purposefully selected based on their willingness to participate and the inclusion and exclusion criteria. Informed consent forms, containing detailed information about the research and the intervention method, were provided to the participants for review and signature. The participants were then invited to the Gulshan Sports Club in Urmia for an initial assessment, where the pre-test was conducted. The sequence of random grouping was determined using Random Allocation Software version 1.0.0. The 34 participants were randomly assigned into two BQ group: (17 patients) and a walking group (17 patients).

Baduanjin Qigong group

The participants in BQ group practiced BQ for 12 weeks, with sessions held three times a week at the Gulshan Club in Urmia. All exercise sessions were led by a certified Baduanjin instructor. Each session lasted approximately 50 minutes, consisting of a 10-minute warm-up, 30 minutes of BQ practice, and a 10-minute cool-down. Baduanjin is part of the New Health Qigong Exercise Series, compiled and published by the Chinese Health Qigong Association (9). As a safe aerobic exercise, BQ aligns with the principles of kinetics and physiology. The practice consists of eight significant movements, illustrated in Table 1. Previous research has indicated that the optimal duration for BQ exercise ranges from 6 to 24 weeks, with a total of 120 to 300 minutes per week proving beneficial for stroke patients (24). Therefore, in this study, a 12-week exercise program was implemented for the participants. Mastery of BQ and Tai Chi is considered a low-intensity physical activity, with the mean maximum induced heart rate ranging from 43% to 49% of the predicted maximum heart rate (25).

The Baduanjin exercises are characterized by frequent weight shifting to one's limit of stability, reaching beyond the base of support, changing the base of support, sustained squatting motions, and heel raises. The 8 forms are linked together with smooth transitions from one form to the next. For Forms 1 to 7, participants were required to repeat 6 times of each form before transition to the next. After form 8 was repeated 7 times, the whole Set of Baduanjin exercises was completed an according to the study of Yuen et al., in 2021 (24).

Walking group

The walking group participated in a 12-week fitness walking program. Each week, they engaged in three 50-minute sessions, maintaining an intensity of 50% of their maximum heart rate. Participants' heart rates were continuously monitored using smart watches. The group walks took place in one of the parks in Urmia city.

Data analysis

All statistical analyzes were performed with SPSS® 26.0. The Shapiro-Wilk test results substantiate the normal distribution of data for both groups under study ($p > 0.05$). The paired t-test and Independent t-test were used to analyze the data.

Ethical considerations

Prior to participation in the study, all participants provided written informed consent and were assured that they would withdraw from the research at any stage. The Ethics Committee of Urmia University approved the study (ID IR.URMIA.REC.1402.026).

Results

The demographic information of the study participants are presented in Table 2.

The paired t-test indicated a significant difference from pre-test to post-test in PSQI total (Figure 1), FIQR (Figure 2), FIQR function and FIQR symptoms between the two groups. Significant improvements were observed in the BQ group for PSQI total ($t(16) = 3.65$, $p = 0.002$), FIQR ($t(16) = 3.76$, $p = 0.002$), FIQR function ($t(16) = 2.16$, $p = 0.04$), FIQR symptoms ($t(16) = 2.957$, $p = 0.009$). (Table 3)

The results of the independent t-test showed a significant difference between the average post-test scores of the walking group and the BQ group in daytime dysfunction ($p \leq 0.05$), with the BQ group performing better than the walking group. However, there was no significant difference between this groups in other variables in both the pre-test and post-test ($p > 0.05$). (Table 4)

Table 1. Eight forms of Baduanjin

Form 1. Two Hands Hold up the Heaven
Form 2. Drawing the Bow to Shoot the Eagle
Form 3. Separate Heaven and Earth
Form 4. Wise Owl Gazes Backwards
Form 5. Sway the Head and Shake the Tail
Form 6. Two Hands Hold the Feet
Form 7. Clench the Fists and Glare Fiercely
Form 8. Bouncing on the Toes

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Table 2. Demographic information of fibromyalgia patients

Characteristics	Baduanjin Qigong group (n = 17)	Walking group (n = 17)	p
Marital status (married/single)	14.13	17.0	
Age (years)	65.65 ± 0.70	65.71 ± 3.05	0.93
Weight (kg)	72.18 ± 11.57	76.94 ± 7.53	0.16
Height (m)	158.59 ± 1.97	162.00 ± 2.69	0.0005
MMSE score	29.64 ± 0.78	29.70 ± 0.68	0.81
Time since diagnosis (months)	10.70 ± 4.72	12.58 ± 4.87	0.26

Table 3. Paired t-test results for intragroup comparisons

	Group	Pre-test M ± SD	Post-test M ± SD	t	p
FIQR	Walking	50.13 ± 23.75	49.42 ± 23.68	1.668	0.115
	Baduanjin Qigong	42.46 ± 21.35	38.72 ± 19.48	3.764	0.002
FIQR function	Walking	12.72 ± 6.58	12.80 ± 6.76	-0.436	0.668
	Baduanjin Qigong	12.90 ± 6.70	12.19 ± 6.18	2.167	0.046
FIQR impact	Walking	13.00 ± 12.94	12.35 ± 13.47	1.454	0.165
	Baduanjin Qigong	7.23 ± 5.815	6.64 ± 5.036	1.295	0.214
FIQR symptoms	Walking	24.41 ± 11.65	24.26 ± 11.26	0.486	0.633
	Baduanjin Qigong	22.32 ± 11.56	19.88 ± 11.00	2.957	0.009
PSQI total	Walking	13.82 ± 5.05	11.64 ± 2.82	1.75	0.098
	Baduanjin Qigong	11.88 ± 3.87	10.64 ± 3.58	3.65	0.002
Subjective sleep quality	Walking	1.82 ± 0.72	1.88 ± 0.69	-1.000	0.332
	Baduanjin Qigong	2.05 ± 0.65	1.88±.78	1.85	0.083
Sleep latency	Walking	1.76 ± 1.03	1.82±1.01	-1.000	0.33
	Baduanjin Qigong	2.11 ± 0.78	1.82±.88	2.06	0.056
Sleep duration	Walking	1.76 ± 0.66	1.88±.69	-1.000	0.33
	Baduanjin Qigong	2.17 ± 1.33	2.11 ± 1.31	1.000	0.33
Sleep efficacy	Walking	1.11 ± 1.05	1.117 ± 0.92	0.000	1.000
	Baduanjin Qigong	1.29 ± 1.21	1.23 ± 1.14	1.000	0.33
Sleep disturbances	Walking	1.76 ± 0.56	1.82 ± 0.52	-0.56	0.57
	Baduanjin Qigong	1.82 ± 0.63	1.76 ± 0.56	0.56	0.57
Sleep medication	Walking	1.58 ± 1.46	1.58 ± 1.37	0.000	1.000
	Baduanjin Qigong	1.05 ± 1.39	1.05 ± 1.39		
Daytime dysfunction	Walking	1.70 ± 0.84	1.52 ± 0.87	1.85	0.08
	Baduanjin Qigong	1.29 ± 1.04	0.76 ± 0.90	2.16	0.04

*Statistically significant at $p \leq 0.05$

Table 4. Independent t-test results for intergroup comparisons

	Group	Walking M ± SD	Baduanjin Qigong M ± SD	t	p
FIQR	Pre-test	50.13 ± 23.75	42.46 ± 21.35	0.991	0.329
	Post-test	49.42 ± 23.68	38.72 ± 19.48	1.438	0.160
FIQR function	Pre-test	12.72 ± 6.58	12.90 ± 6.70	-0.077	0.939
	Post-test	12.80 ± 6.76	12.19 ± 6.18	0.273	0.786
FIQR impact	Pre-test	13.00 ± 12.94	7.23 ± 5.815	1.675	0.104
	Post-test	12.35 ± 13.47	6.64 ± 5.036	1.635	0.112
FIQR symptoms	Pre-test	24.41 ± 11.65	22.32 ± 11.56	1.675	0.104
	Post-test	24.26 ± 11.26	19.88 ± 11.00	1.635	0.112
PSQI total	Pre-test	13.82 ± 5.05	11.88 ± 3.87	1.257	0.218
	Post-test	11.64 ± 2.82	10.64 ± 3.58	0.903	0.373
Subjective sleep quality	Pre-test	1.82 ± 0.72	2.05 ± 0.65	-0.988	0.330
	Post-test	1.88 ± 0.69	1.88 ± 0.78	0.000	1.000
Sleep latency	Pre-test	1.76 ± 1.03	2.11 ± 0.78	-1.124	0.269
	Post-test	1.82 ± 1.01	1.82 ± 0.88	0.000	1.000
Sleep duration	Pre-test	1.76 ± 0.66	2.17 ± 1.33	-1.139	0.263
	Post-test	1.88 ± 0.69	2.11 ± 1.31	-0.651	0.520
Sleep efficacy	Pre-test	1.11 ± 1.05	1.29 ± 1.21	-0.453	0.654
	Post-test	1.117 ± 0.92	1.23 ± 1.14	-0.329	0.744
Sleep disturbances	Pre-test	1.76 ± 0.56	1.82 ± 0.63	-0.286	0.777
	Post-test	1.82 ± 0.52	1.76 ± 0.56	0.314	0.755
Sleep medication	Pre-test	1.58 ± 1.46	1.05 ± 1.39	1.082	0.287
	Post-test	1.58 ± 1.37	1.05 ± 1.39	1.117	0.272
Daytime dysfunction	Pre-test	1.70 ± 0.84	1.29 ± 1.04	1.260	0.217
	Post-test	1.52 ± 0.87	0.76 ± 0.90	2.508	0.017

*Statistically significant at $p \leq 0.05$

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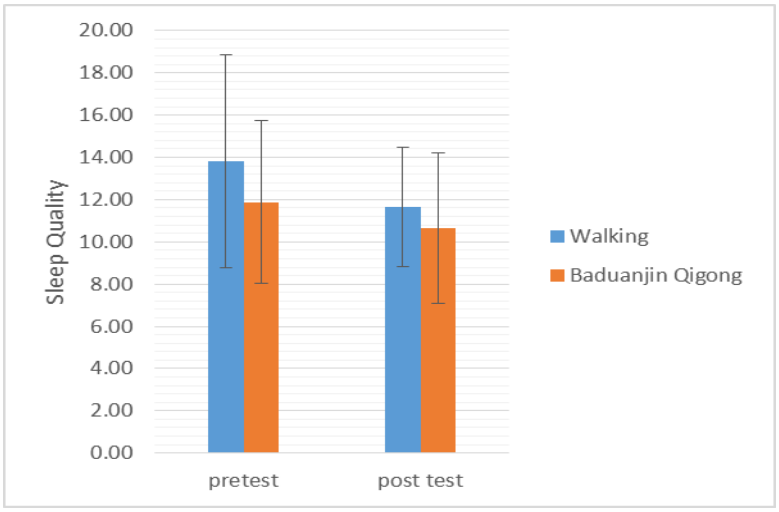

Figure 1. Comparison of pre-test and post-test sleep quality scores

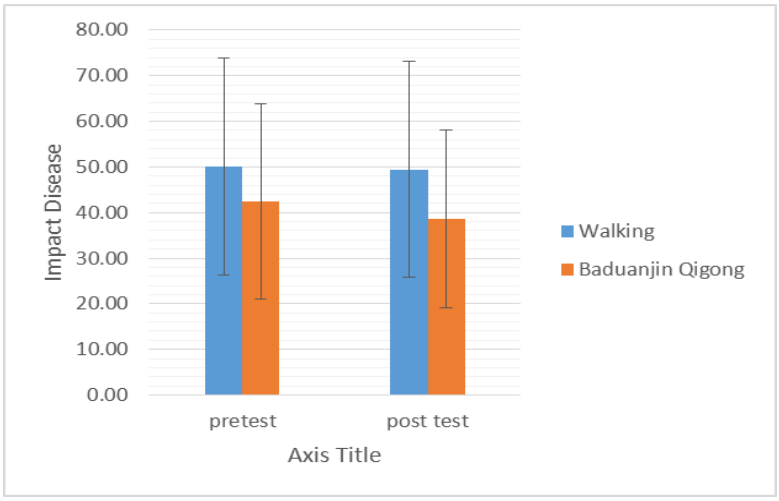

Figure2. Comparison of pre-test and post-test impact disease scores

Discussion

The aim of this study was to evaluate the effects of BQ on the impact of FM and the quality of sleep in elderly patients. The results indicate significant improvements in both the impact of the disease and sleep quality among participants who practiced BQ. These improvements can be attributed to the holistic approach of Qigong, which combines physical movement, breathing techniques, and mental focus. This combination may help reduce pain, enhance relaxation, and improve overall well-being. Our results were consistent with Haak and Scott (16), Jiao et al., (15) and Martínez et al., (12).

Ohayon et al., (26) suggested that mild or moderate mental disorders such as anxiety or depression are often accompanied by sleep disturbances. A study further supports this connection, demonstrating that Baduanjin can alleviate these symptoms in FM patients (16). Therefore, one possible explanation for the observed improvement in sleep quality may be the enhancement of mental states, leading to better sleep.

Another finding was the reduction of the impact of the disease in the BQ group. Winfield (27) suggests that stress can significantly influence pain intensity. One possible explanation for this is that Qigong practice may alleviate pain by affecting the autonomic nervous system, either by enhancing parasympathetic activity or reducing sympathetic activity (27). Zhang et al., (28) found a notable increase in alpha wave activity in the brain's frontal regions during Qigong practice. Farthing (29) indicates that heightened alpha wave activity in these areas may signify reduced cortical activity and information processing, which could be associated with greater mental and emotional relaxation.

Another finding in this study was that daytime dysfunction was less in the BQ group compared to the walking group. But in other variables, there was no difference between the two groups. This indicates that Baduanjin exercise is not better than walking in reducing the impact of FM disease and improving the quality of sleep. Moreover, the gentle nature of BQ makes it particularly suitable for elderly patients who

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may have limitations in performing more strenuous exercises. The study's findings support the hypothesis that BQ can be an effective complementary therapy for FM, providing a safe and accessible option for patients seeking non-pharmacological interventions. The findings suggest that Baduanjin, due to its simplicity and gentle nature, is not only easy to learn but also well-tolerated by elderly individuals. This makes it a promising non-pharmacological therapy for managing FM symptoms. Future research should explore the long-term effects of BQ on FM and investigate its potential benefits in larger and more diverse populations. Additionally, comparing BQ with other forms of exercise and therapies could provide further insights into its relative efficacy.

Conclusion

In conclusion, this study demonstrates that BQ significantly improves the impact of FM and sleep quality in elderly patients. Additionally, it was found to reduce daytime dysfunction more effectively than walking. However, for other variables, BQ did not show superiority over walking, suggesting that while beneficial, it is not necessarily more effective than walking in reducing the overall impact of FM and enhancing sleep quality. Future research should investigate the optimal dosage of BQ, the long-term effects of the intervention, and its potential benefits when combined with other therapies. These studies could provide deeper insights and more comprehensive strategies for managing FM and improving patients' quality of life.

Study limitations

This study has several limitations. First, the convenience sampling method was adopted, and all participants were selected from the same center, which may have reduced the representativeness of the sample. Therefore, the results can only be generalized to individuals with similar demographic and clinical characteristics as our study participants. Second, the sample size was relatively small, which may affect the statistical power of the study and limit the ability to detect smaller effects. Future research with larger and more diverse samples is necessary to validate these findings. Third, the study did not include a long-term follow-up, so the sustainability of the observed effects over time remains unknown. Future studies should consider including follow-up assessments to examine the long-term benefits of BQ in elderly patients with fibromyalgia.

Conflict of interests

The authors declare no conflict if interests.

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Authors' contributions

Conceptualisation, HAS, RK, EA, IS and BSS; Data curation, HAS, RK and EA; Formal analysis, HAS, RK and EA; Funding acquisition, none; Investigation, HAS, RK and EA; Methodology, HAS, RK, EA, IS and BSS; Project administration, HAS, RK and EA; Resources, HAS, RK and EA; Software, HAS, RK and EA; Validation, HAS, RK, EA, IS and BSS; Visualisation, HAS, RK, EA, IS and BSS; Writing (original draft), HAS, RK and EA; Writing (review and editing), IS and BSS. All authors have read and agreed to the published version of the manuscript.

References

1. McDonald M, daCosta DiBonaventura M, Ullman S. Musculoskeletal pain in the workforce: the effects of back, arthritis, and fibromyalgia pain on quality of life and work productivity. Journal of Occupational and Environmental Medicine. 2011; 53(7): 765-70.
2. Lindell L, Bergman S, Petersson IF, Jacobsson LT, Herrström P. Prevalence of fibromyalgia and chronic widespread pain. Scandinavian Journal of Primary Health Care. 2000; 18(3): 149-53.
3. Wolfe F, Clauw DJ, Fitzcharles MA, Goldenberg DL, Katz RS, Mease P, et al. The American College of Rheumatology preliminary diagnostic criteria for fibromyalgia and measurement of symptom severity. Arthritis Care & Research. 2010; 62(5): 600-10.
4. Astin JA, Berman BM, Bausell B, Lee W-L, Hochberg M, Forys KL. The efficacy of mindfulness meditation plus Qigong movement therapy in the treatment of fibromyalgia: a randomized controlled trial. The Journal of Rheumatology. 2003; 30(10): 2257-62.
5. Lautenschläger J. Present state of medication therapy in fibromyalgia syndrome. Scandinavian Journal of Rheumatology. 2000; 29(113): 32-6.
6. Li Yt, Jiang Q, Jia Y, Zhang Yf, Xiao Yy, Wang H, et al. A Chinese version of the revised fibromyalgia impact questionnaire: a validation study. International Journal of Rheumatic Diseases. 2023; 26(2): 242-9.
7. Sawynok J, Lynch ME. Qigong and fibromyalgia circa 2017. Medicines. 2017; 4(2): 1-9.
8. Wahbeh H, Elsas SM, Oken BS. Mind–body interventions: applications in neurology. Neurology. 2008; 70(24): 2321-8.
9. Barrós-Loscertales A, Hernández SE, Xiao Y, González-Mora JL, Rubia K. Resting state functional connectivity associated with Sahaja yoga meditation. Frontiers in Human Neuroscience. 2021; 15: 1-11.
10. Jahnke R, Larkey L, Rogers C, Etnier J, Lin F. A comprehensive review of health benefits of qigong and Tai Chi. American Journal of Health Promotion. 2010; 24(6): 1-37.
11. Guo C, Wang Y, Wang S, Zhang S, Tai X. Effect and mechanism of traditional Chinese medicine exercise therapy on stroke recovery. Evidence-Based

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Complementary and Alternative Medicine. 2023; 2023(1): 1-16.
12. Martínez N, Martorell C, Espinosa L, Marasigan V, Domènech S, Inzitari M. Impact of Qigong on quality of life, pain and depressive symptoms in older adults admitted to an intermediate care rehabilitation unit: a randomized controlled trial. Aging Clinical and Experimental Research. 2015; 27(2):125-30.
13. Liu Z, Hu H, Wen X, Liu X, Xu X, Wang Z, et al. Baduanjin improves neck pain and functional movement in middle-aged and elderly people: A systematic review and meta-analysis of randomized controlled trials. Frontiers in Medicine. 2023; 9: 1-11.
14. Wang F, Zhang X, Tong X, Zhang M, Xing F, Yang K, et al. The effects on pain, physical function, and quality of life of quadriceps strengthening exercises combined with Baduanjin qigong in older adults with knee osteoarthritis: a quasi-experimental study. BMC Musculoskeletal Disorders. 2021; 22(1): 1-11.
15. Jiao J, Russell IJ, Wang W, Wang J, Zhao YY, Jiang Q. Ba-Duan-Jin alleviates pain and fibromyalgia-related symptoms in patients with fibromyalgia: results of a randomised controlled trial. Clinical and Experimental Rheumatology. 2019; 37(6): 953-62.
16. Haak T, Scott B. The effect of Qigong on fibromyalgia (FMS): a controlled randomized study. Disability and Rehabilitation. 2008; 30(8): 625-33.
17. Saeed Ali H, Khanmohammadi R, Arabameri E, Shaw I, Shaw B. The effect of baduanjin qigong on lower limb strength and balance in elderly patients with Fibromyalgia. The Neuroscience Journal of Shefaye Khatam. 2024; 12 (2): 42-55.
18. Arroyo-Fernández R, Avendaño-Coy J, Velasco-Velasco R, Palomo-Carrión R, Bravo-Esteban E, Ferri-Morales A. Effectiveness of transcranial direct current stimulation combined with exercising in people with fibromyalgia: a randomized sham-controlled clinical trial. Archives of Physical Medicine and Rehabilitation. 2022; 103(8): 1524-32.
19. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. Journal of Psychiatric Research. 1975; 12(3): 189-98.
20. Smyth C. The Pittsburgh sleep quality index (PSQI). Journal of Gerontological Nursing; 1999; 25(12): 10-11.
21. Ahmadi S, Khankeh H, Mohammadi F, Khoshknab F, Reza Soltani P. The effect of sleep restriction treatment on quality of sleep in the elders. Iranian Journal of Ageing. 2010; 5(2): 7-15. [Persian]
22. Vaidya B, Nakarmi S, Bhochhibhoya M, Joshi R. Translation, validation and cross-cultural adaptation of the Revised Fibromyalgia Impact Questionnaire (FIQR) in Nepali language. International Journal of Rheumatic Diseases. 2020; 23(7): 939-44.
23. Ghavidel Parsa B, Amir Maafi A, Haghdoost A, Arabi Y, Khojamli M, Chatrnour G, et al. The validity and reliability of the Persian version of the revised fibromyalgia impact questionnaire. Rheumatology International. 2014; 34(2): 175-80.
24. Yuen M, Ouyang H, Miller T, Pang MY. Baduanjin qigong improves balance, leg strength, and mobility in individuals with chronic stroke: a randomized controlled study. Neurorehabilitation and Neural Repair. 2021; 35(5): 444-56.
25. Lan C, Chou SW, Chen SY, Lai JS, Wong MK. The aerobic capacity and ventilatory efficiency during exercise in Qigong and Tai Chi Chuan practitioners. The American Journal of Chinese Medicine. 2004; 32(1): 141-50.
26. Ohayon MM, Carskadon MA, Guilleminault C, Vitiello MV. Meta-analysis of quantitative sleep parameters from childhood to old age in healthy individuals: developing normative sleep values across the human lifespan. Sleep. 2004; 27(7): 1255-73.
27. Choy ES. The patient with diffuse pain. In: Imboden JB, Hellmann DB, Stone JH, editors. Current rheumatology diagnosis and treatment. 1st ed. New York: McGraw-Hill; 2004.
28. Jian-Zhou Z, Jing-Zhen L, Qing-Nian H. Statistical brain topographic mapping analysis for EEGs recorded during Qi Gong state. The International Journal of Neuroscience. 1988; 38(3-4): 415-25.
29. Farthing GW. The psychology of consciousness. Prentice-Hall, Inc; 1992.

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