

Effects of Baduanjin qigong exercise on sleep quality in patients with chronic insomnia disorder

Qiuai Ren¹, Haixia Yang^{2*}, Zhengwei Du³

Abstract

Chronic insomnia is quite widespread, although there is extensive epidemiological data to imply it is the most chronic sleep issue in the industrialized world. This is linked to poor relaxation and things in life, decreased efficiency, an elevated chance of injuries, and severe illness. As a result, it is effectively treated in order to enhance the quality of life for patients. However, healthcare organizations in all disciplines of medicine face therapeutic obstacles as a result. Qigong practice, according to traditional Chinese medicine, may purify one's life and connect mind and body. Baduanjin is an easy-to-learn, mild-to-moderate intensity health aerobic exercise that consists of eight effortless movements that work on specific body parts, which relaxes the mind, regulates breathing, lowers activation levels in the autonomous nervous system, and improves sleep quality among Chinese traditional Health-Qigong exercises. The study's participants will be randomly assigned to one of two groups: experimental and control. Baduanjin exercise will be given to the experimental group, while Pharmacotherapy will be given to the control group. The Insomnia severity index of patients was assessed after 12 weeks of therapy. Finally, the data is statistically examined using the ANOVA, Kolmogorov-Smirnov test, and logistic regression models. In comparison to pharmaceuticals, this research revealed that the Baduanjin Qigong exercise program may enhance the quality of sleep in a safer and more cost-effective method with fewer adverse effects.

Keywords: Chronic Insomnia, Baduanjin Qigong Exercise, Sleep Quality, Analysis of Variance (ANOVA), Logistic regression model, and Kolmogorov-Smirnov test [*Ethiop. J. Health Dev.* 2022; 36(4) (00-00)]

Introduction

Chronic Insomnia (CI) is among the most common sleep problems on the planet. It is the second most frequent psychological health disorder, affecting one out of every three individuals worldwide and 10% to 15% of the global population. Based on Government statistics, sleeplessness is the 11th most common brain condition in terms of worldwide impact. Insomnia has long been linked to issues in brain performance, poor mental health, and poor health-related quality of life. Untreated insomnia is financially expensive because of its connected lack of work productivity and increased absenteeism, including effort emergencies that contribute to approximately 5 million doctor appointments each year, are described by Hassinger et al., (2021) and Lu et al., (2019). Chronic insomnia would be a health risk for various mental and physical conditions, including stress, hypotension, diabetes, and heart problems. Considering that nearly 32 million people in the world suffer from chronic insomnia, the health effects and economic implications are significant. Recognizing basic variables related to the disorder's persistence and, as a consequence, raising the risk of adverse health effects is a key health issue. Because there has been a lot of studies just on behavioural variables which contribute to the success and maintenance of CI, less would be reported about the neurobehavioral side effects of insomnia are specified by Vargas et al., (2018) and Fank et al., (2022). Chronic insomnia problem is a severe psychological issue that frequently goes undiagnosed and may cause serious health issues when left untreated. Insomnia is a psychological tendency that is expressed by its most of the Diagnostic and Statistical Manual of Mental

Disorders ("DSM-5") as both an affliction indicated by persistent difficulties involved initiating or staying asleep "at least two or three nights a week at least a month," even through regular sleep opportunities are discussed by Roach et al., (2021) and Wang et al., (2022). Qigong practice has been shown to enhance the quality of sleep in healthy older persons. Baduanjin qigong is a growingly famous mind-body workout that combines physical, mental, interpersonal, and contemplative elements. It was a full-body workout that incorporated relaxation and coordinated body motions. This is known to remove bones, stimulate natural, calm breaths, and treat a variety of diseases. Baduanjin, which translates to "eight sections of bodices," is recognized for its simple, calm, and peaceful motions. According to traditional Chinese medical philosophy, the exercise consists of eight basic motions, each of which may improve the functioning of specific organ systems or bodies are identified by Ramesh & Shah (2019) and Jones et al., (2022). Fig.1 depicts the complications of chronic insomnia disorder.

As an essential component of Qigong, Baduanjin is characterized as a mind-body practice that merges spirituality and concentration, slow and gentle movements, joint flexibility, and taking deep breaths. According to Mody & Bhoosreddy (1995) and Li et al., (2022) identify that the Baduanjin exercise dates back to the "Song Dynasty" and also has a record of over a thousand years. Baduanjin exercise consists of eight different positions, each of which may benefit different parts of the body or specific organs. Baduanjin exercise, qigong-like, is a cross-treatment that includes physical, psychological, intellectual, and spiritual elements.

1. School of Nursing, Weinan Vocational and Technical College

2. Encephalopathy department, Traditional Chinese Medicine Hospital of Shaanxi Province

3. internal medicine department, Weinan Maternal and Child Health care Hospital

Email: yanghaixia2022w@126.com

Complications of Chronic **Insomnia** disorder

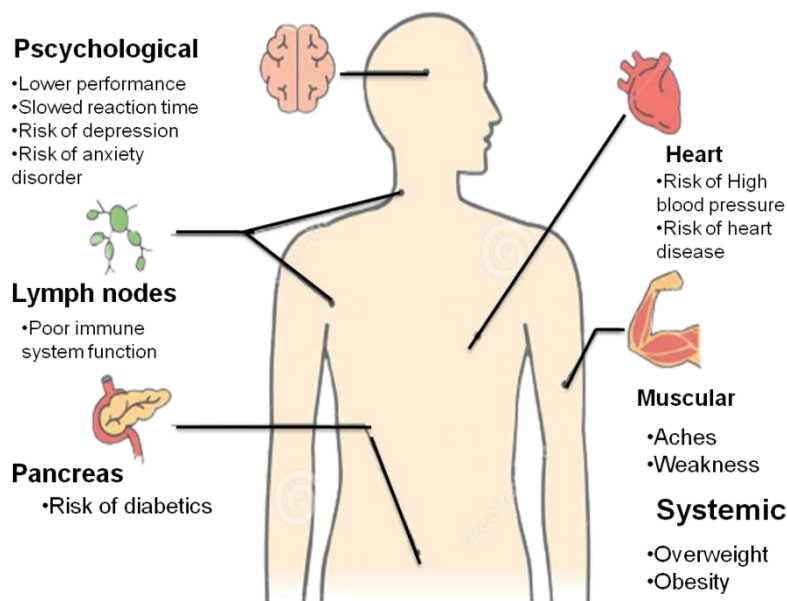


Figure 1. Complications of Chronic Insomnia Disorder

Qigong, on the other hand, demands a high level of balance and intellect and may be too taxing for certain senior people. Baduanjin qigong, for example, has 24 arm and leg motions that must be performed in at least 90 minutes. Unlike Baduanjin, it requires just eight basic and easy-to-learn fixed arm motions and very no leg movements and can be performed in less than 30 minutes. As a result, as compared to Qigong, Baduanjin exercise on sleep quality in patients with chronic insomnia disorder making with practices in a short amount of time are analyzed by Zeng et al., (2020) and Garg (2021). Depression, which is both profound and long-lasting, is a hallmark symptom of major depressive disorder, which is a chronic mental health condition. It is one of the psychiatric conditions that affect the most people. The clinical signs include a persistently sad mood, delayed thinking, and decreased energy; nevertheless, some patients may also suffer a lack of appetite, poor self-esteem, and, in rare circumstances, suicidal impulses. Some studies have shown that the prevalence of major depression in China is 3.02 percent. In comparison, the prevalence of depression in China reached 7.3 percent in 2020 as people's life stresses increase with the development of time, while the prevalence of depression is detected in 24.6 percent of adolescents in China as emphasized by Lin et al., (2022). One study found that 90 percent of people who have been diagnosed with depression also have sleep abnormalities. Sleep disturbances are accompanied by major depressive disorder in the majority of depressed patients. Insomnia, on the other hand, is a potential risk factor for depression, which can aggravate the condition and lead to prolonged depression, thereby seriously affecting the patient's life and work, as determined by McGee (2022). Therefore, effective treatment can better alleviate the patient's condition and reduce the enormous financial burden on the patient's family and society. At the moment, anti-insomnia drugs are frequently utilized in the treatment of depression that is accompanied by insomnia; however, long-term use of oral Western medicine will result in the development of drug

resistance. Additionally, the rising drug dose and adverse drug reactions will have an impact on the health of patients are addressed by Juan et al., (2022) and Ma et al., (2022). The practise known as Baduanjin is a classic form of Chinese qigong that places an emphasis on integrating the practitioner's body and mind. The Baduanjin exercise is a low-energy kind of exercise that may not only improve people's physical appearance but also manage their mood. As a result, individuals who do this exercise are able to relieve stress and relax while they are working out. It may be used as a preventative measure as well as an adjunct therapy for both physical and mental illnesses. There are no rigorous randomized controlled studies to evaluate the clinical efficacy of Baduanjin exercise in the treatment of depression combined with insomnia, and there is a lack of long-term follow-up observations. Despite the fact that it has been suggested that Baduanjin exercise can improve depression and sleep quality in patients, there is no evidence to support these claims are explored by Cui et al., (2022).

A Baduanjin Qigong exercise program's effect on chronic insomnia sufferers' sleep quality is thus explored here. The remainder of the description is divided into five parts: Segment 2: related works and problem definition, Segment 3: the methodology used, Segment 4: result and discussion, and Segment 5: conclusion.

Related works

Fan et al., (2020) used how effective a Baduanjin exercise programme was for community-dwelling older people who had sleep problems. Shahabaz and Afzal (2021) specified the usage of high-dose-rate (HDR) brachytherapy avoids radioactivity, allows for outpatient therapy, and reduces diagnosis timeframes. A single-stepping source could also enhance dosage dispersion by adjusting latency at every dwell location. The shorter processing intervals need not permit any error checking, and inaccuracies could injure individuals. Hence HDR brachytherapy therapies

should be performed properly. According to Yao et al., (2020), traditional Chinese Exercise (“TCE”) has been demonstrated to be an effective and easy therapy for cancer-related sleep disturbances. TCE’s effects on cancer-related sleep disruption were summarized and assessed in this research. Ahmed et al., (2020) determined the allergic rhinitis would be a long-standing worldwide epidemic. Taiwanese doctors commonly treat it with either traditional Chinese or Chinese–Western drugs. He et al., (2021) specified the effects of TCEs and GAEs on sleep quality in older persons, as well as the differences between the two therapies, were investigated in this research. Li (2022) illustrated the treatment as well as the technology of domestic sewage to improve the rural surroundings. Cheung et al., (2021) indicated the effects of qigong treatments on cancer patients’ sleep disturbance-related symptom clusters, as well as the probable mediation role of tiredness and sadness in impacting sleep. Cheung et al., (2022) concluded that the qigong Baduanjin might help elderly cancer survivors reverse their weakness. Xie et al., (2021) concluded that the prolonged life with nine turn method (PLWNT) Qigong exercise affects Chronic fatigue syndrome (CFS) symptoms, including tiredness, sleep quality, sadness, and anxiety. CFS is a complicated illness with no clear cause or mechanism. Morin et al., (2021), showed that therapeutic suggestions for persistent insomnia condition. Salihu & Iyya (2022) used soil samples from chosen vegetable farms throughout Zamfara State, Nigeria have been tested for physicochemical & organochlorine pesticides.

Duman et al., (2018) illustrated that the efficacy of progressive relaxation exercises and sleep hygiene training provided to postmenopausal women with insomnia was investigated using a randomized controlled trial methodology. Tu et al., (2019) determined the research in issue was conducted in Taipei at a community college. In this research, observation, interviewing, and document gathering were used. Interviews were conducted with administration officials, host organisations, and community college employees from the Ba Duan Jin team.

Problem statement

Chronic insomnia refers to a long-term problem of falling and staying asleep. Those with difficulty falling or keeping asleep at least three evenings per week for three months or more are labeled chronic insomniacs. Chronic insomnia is a severe health condition that has serious psychological, physiological, and financial ramifications. However, access to cognitive behavioral therapy, one of the most effective sleep aids, is very restricted.

Methodology Used

Participants in the research will be allocated to one of two groups at random: experimental or control. The treatment group will get Baduanjin exercise, whilst the control group will receive pharmacotherapy. After 12 weeks of treatment, the patients’ insomnia severity index was evaluated. Finally, using the Analysis of Variance and logistic regression models, including the Kolmogorov-Smirnov test, the data is statistically analyzed. Fig.2 indicates the overall methodology used.

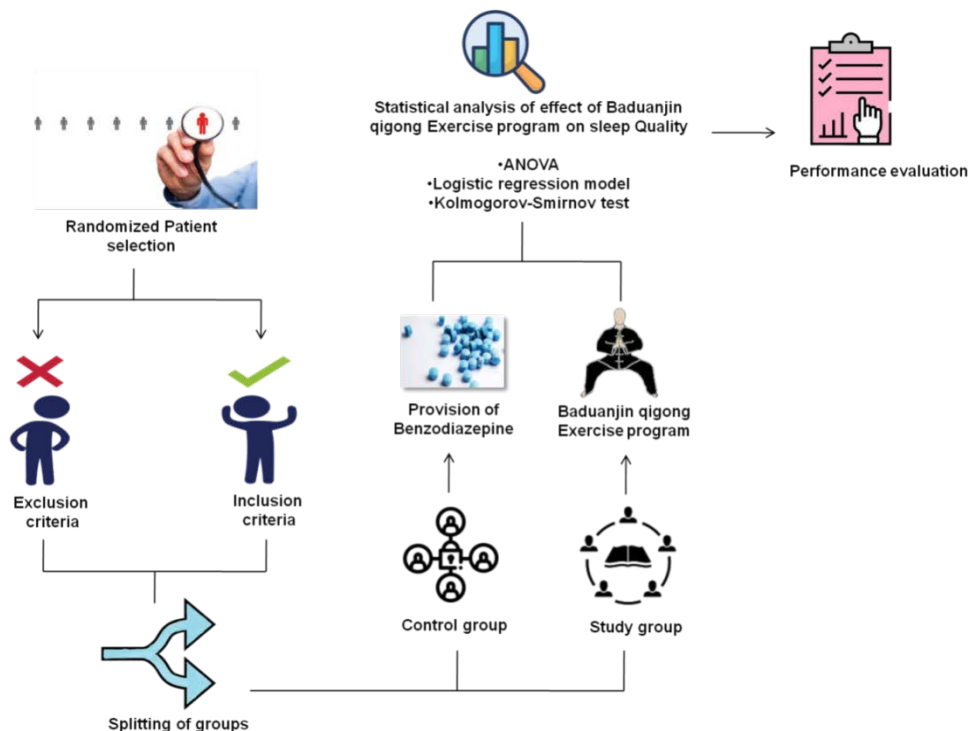


Figure 2. Overall methodology used

Randomized patients’ selection

The hospital information system at Hubei University of Chinese Medicine’s Guo Yi Tang Affiliated Hospital provided the data for this study on insomnia (Wuhan, Hubei, China). To be eligible for record selection, patients had to be 14-70 years old, have been diagnosed with typical insomnia symptoms (sleep disorder is the primary symptom, and the other symptoms are

secondary to it), and have had insomnia for one month to 30 years prior to being considered. Starting on July 1, 2020, participants will be gathered via advertising and personal recommendations. The three basic methods for enlisting insomniacs are as follows. The first tactic was to enlist volunteers from the inpatient and outpatient departments of Shanghai University of Traditional Chinese Medicine, affiliated Yueyang Hospital of

Integrated Traditional Chinese and Western Medicine. Second, to find suitable study participants, printed recruiting posters will be disseminated at the Shanghai University of Traditional Chinese Medicine and in the surrounding areas. Third, we will promote our study online and on social media platforms like WeChat to reach potential participants within our patient population. An estimating method based on the variance between the means and standard deviations of two

samples is used to determine the necessary sample size, are concluded by Guan et al., (2021). With inclusion and exclusion criteria, only 280 chronic insomnia patients are selected for this research from the 350 patients. As per the criteria, the 280 chronic insomnia patients are separated into 2 groupings like control group (n=140) and the investigational group (n=140). Table. 1 depicts the dataset description.

Table 1. Dataset description

Features	Patients with PSC (n=280)		χ^2	P
	Control group (n=140)	Experimental group (n=140)		
Overall sleep	85(57.68) 55(44.59)	70(53.80) 70(46.79)	0.087	0.411
Subjective sleep quality	75(50.10) 65(49.50)	60(44.67) 80(57.78)	0.296	0.155
Sleep latency	77(58.3) 63(41.7)	80(55.21) 60(44.79)	0.286	0.211
Sleep efficiency	80(53.60) 50(47.78)	90(60.80) 50(40.68)	0.279	0.48
Sleep disturbance	60(43.75) 80(56.48)	70(47.58) 70(54.76)	0.068	0.815
Daytime dysfunction	75(53.68) 65(46.90)	80(56.87) 60(43.78)	0.068	0.511
Use of hypnotics	65(44.67) 75(57.59)	70(50.50) 70(49.50)	0.266	0.455

Inclusion and exclusion criteria

Detailed information on the research criteria may be found elsewhere. Researchers' top priorities for the study's design.

- a. Inclusion criteria
 - Meet the diagnostic criteria for depression and insomnia.
 - Those with a Hamilton Depression Rating Scale score ≥ 24 .
 - Age ≥ 18 and ≤ 60 years
 - Antidepressant or sleep aid medication (including Chinese and Western traditional medicine) has not been taken during the past two weeks.
 - The patient consented by signing an informed consent form.
- b. Exclusion criteria
 - Non-depressed patients and those with sleeplessness owing to other medical conditions or drugs are included in this category.
 - Patients who are addicted to alcohol, drugs, or other psychoactive substances.
 - Those who have participated or are currently engaging in another clinical research within the previous month;
 - Women who are pregnant, planning to become pregnant, or nursing.

Splitting groups

Here, the gathered data are separated into 2 teams, namely the control team and the experimental team.

Control team

Chronic Insomnia Patients with the demographics shown in Table 1 are part of this group, which also includes 140 others who are treated in accordance with conventional procedures for evaluating patients' health. Standard treatment

In the control group, the patients are treated with benzodiazepines. Anti-GABA and anti-GABA agonist benzodiazepines are found in the GABAergic system. In comparison to barbiturates, they have a lower risk of overdose and misuse. Sleep duration and quality are improved by benzodiazepines, which decrease sleep onset latency and alertness after sleep onset and boost sleep efficiency at the same time.

Investigational team

This team has 140 patients, and these patients are enrolled in the Baduanjin qigong Exercise on sleep quality of patients as illustrated in Table 1.

Baduanjin qigong exercise

During the course of the 12-week programme, the Baduanjin exercise group will work out five days a week for 40 minutes a day. The Baduanjin exercise training will be held at Wufeng Community Center, where there will be three training groups of 35 to 40 persons each. We will engage three experienced coaches who have taught physical education to college students at Fujian University of Traditional Chinese Medicine for at least five years each to lead their training. Each Baduanjin training location will have two supervisors in charge of administration to ensure the quality of instruction. Figure 3 depicts the Baduanjin workout technique.



Figure 3. The procedure of Baduanjin exercise

Statistical analysis

The ANOVA, Logistic regression model, and Kolmogorov-Smirnov test are used to evaluate the Baduanjin Qigong exercise programme may enhance the quality of sleep.

ANOVA test

Analysis of variance, or ANOVA, is a quantitative tool for dividing reported variability data into multiple parts for use in subsequent tests. A one-way ANOVA has been used to discover the relationship between variables when there are 3 or more data sets. The classic ANOVA F-statistic is the proportion of average sums of squared of the null model with anthropic principle to the whole model. The parameters are calculated using the least-squares approach, with all variances being identical. This may be expressed as:

$$G = NT_{between}/NT_{error} \quad (1)$$

Where

$$NT_{between} = \frac{\sum_{j=1}^h o_j (\bar{y}_j - \bar{y})^2}{h-1} \quad (2)$$

and

$$NT_{error} = \frac{\sum_{j=1}^h \sum_{k=1}^{o_j} (y_{jk} - \bar{y}_j)^2}{O-h} \quad (3)$$

The Welch-test-statistic is defined as

$$X = \frac{\sum_{j=1}^h x_i [(\bar{y}_j - \bar{y})^2 / (h-1)]}{1 + \frac{2(h-2)}{h^2-1} \sum_{j=1}^h [(1-x_i/v)^2 / (o_j-1)]} \quad (4)$$

Where $X_i = \frac{n}{t_i^2}$, $u = \sum_{j=1}^h X_j$ and $Y = \frac{1}{u} \sum_{j=1}^h X_j Y_j$ is defined as:

$$g = \frac{h^2-1}{3 \sum_{j=1}^h [(1-x_i/v)^2 / (o_j-1)]} \quad (5)$$

The Brown-Forsythe-test-statistic is defined as:

$$G^* = \frac{\sum_{j=1}^h o_j (\bar{y}_j - \bar{y})^2}{\sum_{j=1}^h (1-o_j/O) T_j^2}$$

(6)

When L_0 is factual, the allocation of G^* is appropriate by a central G distribution with degrees of freedom $h-1$ and g , where g is defined as

$$1/g = \sum_{j=1}^h d_j^2 / (o_j - 1), d_j = \frac{(1-o_j/O) T_j^2}{\sum_{j=1}^h (1-o_j/O) T_j^2} \quad (7)$$

To calculate the generalized p-value, the generalized p-value is now computed as $p = 1 - r$, where r is the sample size.

$$r = F \left(I_{h-1, O-h} \left(\frac{O-h}{h-1} \tilde{t}_c \left(\frac{o_1 t_1^2}{c_1 c_2 \dots c_{h-1}}, \frac{o_2 t_2^2}{c_1 c_2 \dots c_{h-1}}, \frac{o_3 t_3^2}{(1-c_2) c_3 \dots c_{h-1}}, \dots, \frac{o_1 t_h^2}{(1-c_{h-1})} \right) \right) \right) \quad (8)$$

The prediction is calculated with regard to separate Beta stochastic process in an F-distribution having $h-1, V-h$ dof.

$$C_k \sim \text{Beta} \left(\sum_{j=1}^k \frac{(o_j-1)}{2}, \frac{o_{k+1}-1}{2} \right), k = 1, 2, \dots, h-1 \quad (9)$$

The p-value is calculated by numerically integrating the anticipated value in the p-value formula with regard to the Beta random variables.

Logistic regression model

The proportional odds (PO) framework, which is the most widely employed logistic design, has been developed.

The groups could be sorted naturally, whereas if response parameter Y was ordinal, like 'fitness condition good/moderate/bad.' The polytomous logistic regression model could be used, but it doesn't employ the sorting data. The use of cumulative possibilities, cumulative odds, and cumulative logits becomes a technique to compensate for the sorting. Those numbers have been specified in $(m+1)$ sorted groups.

$$P(Y \leq j) = p_1 + \dots + p_j \quad (10)$$

$$(Y \leq j) = \frac{P(Y \leq j)}{1 - P(Y \leq j)} = \frac{p_1 + \dots + p_j}{p_{j+1} + \dots + p_{m+1}} \quad (11)$$

$$\text{logit}(Y \leq j) = \ln\left(\frac{P(Y \leq j)}{1 - P(Y \leq j)}\right), j = 1, \dots, m \quad (12)$$

Regarding ordinal response information, the cumulative logistic representation is specified as,

$$\text{logit}(Y \leq j) = \alpha_j + \beta_1 X_1 + \dots + \beta_{jk} X_k, j = 1, \dots, m \quad (13)$$

We get multiple model equations (m) and one logistic variable (β) for every group/covariate pair.

As a result, the generalized cumulative logistic regression method has a lot of variables. In other circumstances, though, a parsimonious method becomes feasible. If the logistic parameters are independent of j, every covariate has only a single common variable. As a result, the cumulative odds were calculated as follows:

$$\text{odds}(Y \leq j) = \exp(\alpha_j) \exp(\beta_1 X_1 + \dots + \beta_k X_k), j = 1, \dots, m \quad (14)$$

Such that the m odds for every cut-off group j vary exclusively in terms of the intercepts, implying that the odds were proportionate.

When the ordinal result Y gets associated with an underlying underlying continuous variable, for instance, whenever Y is indeed a categorized continuous variable like age ranges or cash economic classes, the somewhat strict proportional odds hypothesis could be particularly fitting. Ordinal variables that have been evaluated by an investigator, on the other hand, are another essential sort of ordinal variable. Regarding biomedical analysis, these factors are common.

Kolmogorov-Smirnov test

Assume that Y_1, Y_2, \dots, Y_n and Z_1, Z_2, \dots, Z_n are two independent random samples from two statistical populations, each with the continuous cumulative distribution functions F_Y and F_Z . Let's pretend that the observations of two random samples are fuzzy numbers y_1, y_2, \dots, y_n and z_1, z_2, \dots, z_m instead of crisp data y_1, y_2, \dots, y_n and z_1, z_2, \dots, z_n , respectively. Test hypotheses may be

formulated as follows if we want to compare the two distributions of a particular population:

$$\begin{cases} I_0: G_Y(\tilde{y}) = G_Z(\tilde{z}) \\ I_1: G_Y(\tilde{y}) \neq G_Z(\tilde{z}) \end{cases}$$

(15)

The Kolmogorov-Smirnov two-sample test is a standard approach to test the above assumptions. First, we arrange the ambiguous data of aggregated samples of y_1, y_2, \dots, y_n and z_1, z_2, \dots, z_m to run this test.

$$E = o.n. E_{o,n} = o.n. \max |T_n(\tilde{z}) - T_o(\tilde{y})| \quad (16)$$

It is important to note that E will be a sharp value. The null hypothesis is accepted at the significant level when the observed p-value from the Kolmogorov-Smirnov two-sample test is greater.

Performance evaluation

A Baduanjin Qigong exercise program's effect on chronic insomnia sufferers' sleep quality is thus explored here. Participants in the research will be divided into two groups based on random selection: experimental and control. One group will get Badunjin exercise, and the other will receive Pharmacotherapy as treatment. The Insomnia severity index of patients was assessed after 12 weeks of therapy. A statistical analysis of variance and logistic regression models, as well as the Kolmogorov-Smirnov test, are used to investigate the data. The existing methods include Abdomen-Rubbing qigong (A-Rq), Tai Chi (exercise), Heartfulness Meditation (HM), and Cognitive Behavioral Therapy (CBT).

Overall sleep quality

The overall sleep quality is analyzed for both the control and experimental groups. The insomnia severity index was measured after 12 weeks of treatment for insomnia patients. Fig. 4 indicates the overall sleep quality for proposed and existing methods. The existing methods such as A-Rq with 25, Tai Chi with 38, HM with 20, CBT with 50, and proposed methods with 78.

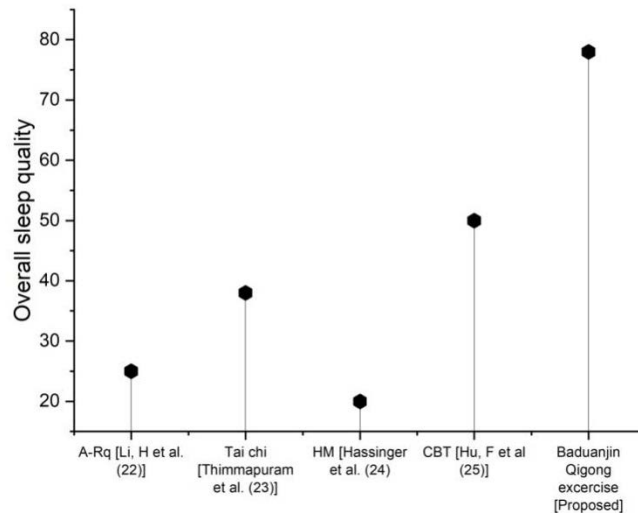


Figure 4. Overall sleep quality for proposed and existing methods

Sleep score

Sleep scores are measured in both the control and experimental groups. Measurement of a patient's insomnia severity index after 12 weeks of Baduanjin qigong Exercise was done. Fig.5 depicts the sleeping

scores of the control and experimental groups. In the pre-test, the control group has 9 scored and the exercise group has 10 scored, 4 weeks, the control group have 9 scored and exercise group have 7.5 scored; 8 weeks the control group have 9 scored and exercise group have 6.5

scored, 12 weeks the control group have 9 scored and exercise group have 4.5 scored.

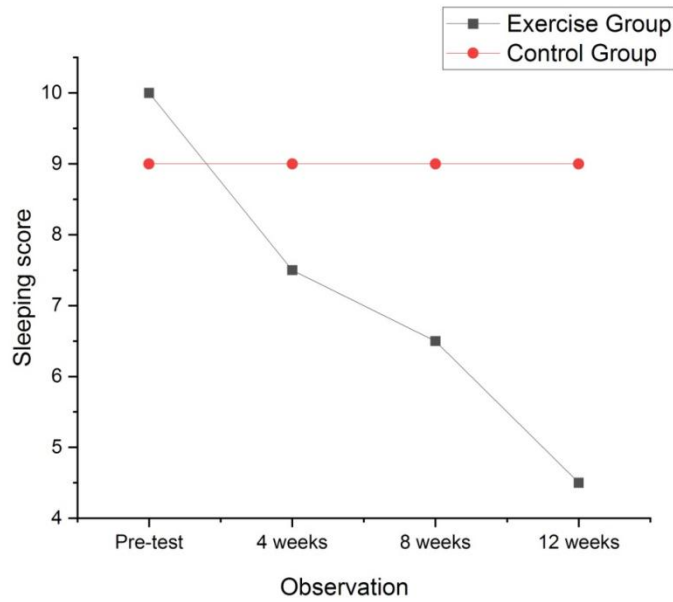


Figure 5. The sleeping score of the control and experimental group

Clinical significant of Chronic insomnia patients

Prior to therapy, patients in both the control and experimental groups had their cases of "clinically severe insomnia" examined and compared. We assessed the depression, anxiety and stress of chronic insomnia patients for pre-exercise and post-exercise. Figure. 6

depicts the chronic insomnia patients. In the experimental group the pre-exercise with 15, post exercise with 22 and 12 weeks with 25 scored and in control group, the pre-exercise with 10, post-exercise 15 and 12 weeks with 20 scored.

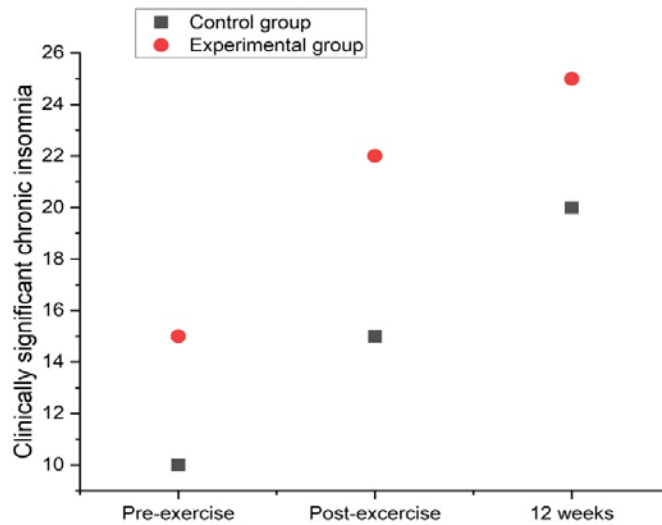


Figure 6. Clinical significant of Chronic insomnia Patients

Quality of life

In quality of life, we assessed physical health, mental health and leisure time. Fig. 7 illustrates the quality of life for chronic insomnia. In control group the physical

health, mental health, and leisure time are scored 20,30 and 35. Experimental group the physical health, mental health and leisure time are scored with 35, 45 and 58.

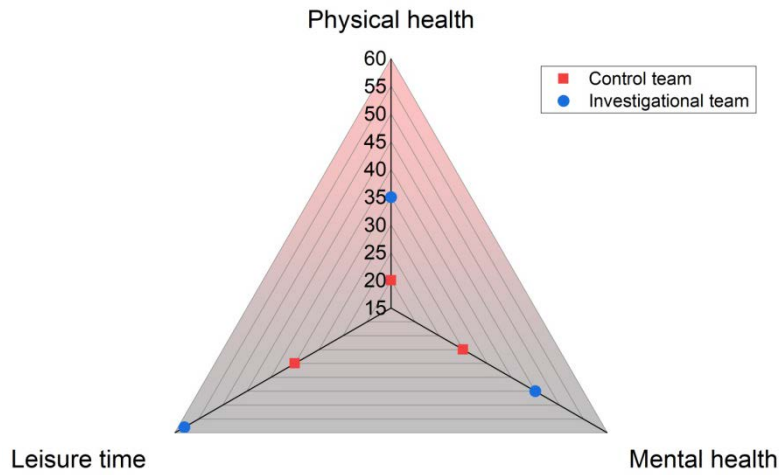


Figure 7. Quality of life for chronic insomnia

Statistical analysis

Statistical analysis using variance and logistic regression models, as well as the Kolmogorov-Smirnov test, are presented.

ANOVA test

The results of ANOVA test results for Chronic insomnia patients are analyzed in various time are shown in the table. 2.

Table 2. ANOVA test for Chronic insomnia patients

Features		Baseline Mean ± SD	Time 1 Mean± SD	Time 1 Mean± SD	Time 1 Mean± SD	F	P
Overall sleep	Control group	12.22 ± 3.38	10.81 ± 3.53	10.60 ± 2.61	10.80 ± 2.50	0.29	0.703
	Experimental group	11.94 ± 4.40	11.04 ± 3.65	8.89 ± 0.85	5.22 ± 3.74	27.04	<0.002
Subjective sleep quality	Control group	2.11 ± 0.748	3.11 ± 0.84	2.27 ± 0.67	3.11 ± 1.79	0.01	0.897
	Experimental group	2.44 ± 0.588	1.07 ± 0.37	1.84 ± 0.43	2.33 ± 0.28	22.54	<0.002
Sleep latency	Control group	3.54 ± 0.498	1.50 ± 0.75	3.46 ± 0.79	1.46 ± 0.79	0.04	0.782
	Experimental group	1.74 ± 0.53	3.52 ± 0.58	1.00 ± 0.29	2.78 ± 0.42	21.76	<0.003
Sleep duration	Control group	2.18 ± 0.72	1.14 ± 0.71	1.14 ± 0.71	1.11 ± 0.69	0.05	0.986
	Experimental group	1.22 ± 0.58	1.00 ± 0.48	0.63 ± 0.49	0.33 ± 0.48	16.14	<0.002
Sleep efficiency	Control group	10.22 ± 3.38	12.81 ± 3.53	13.60 ± 2.61	09.80 ± 2.50	1.29	2.703
	Experimental group	11.94 ± 4.40	11.04 ± 3.65	8.89 ± 0.85	5.22 ± 3.74	27.04	<0.002
Sleep disturbance	Control group	0.11 ± 0.748	3.11 ± 0.84	2.27 ± 0.67	3.11 ± 1.79	1.01	1.897
	Experimental group	0.44 ± 0.588	1.07 ± 0.37	1.84 ± 0.43	2.33 ± 0.28	22.54	<0.002
Daytime dysfunction	Control group	3.54 ± 0.498	1.50 ± 0.75	3.46 ± 0.79	1.46 ± 2.79	1.04	1.782
	Experimental group	1.74 ± 0.53	2.52 ± 0.58	1.00 ± 0.29	0.78 ± 2.42	21.76	<0.003
Use of hypnotics	Control group	0.18 ± 0.72	1.14 ± 0.71	1.14 ± 0.71	1.11 ± 2.69	0.05	1.986
	Experimental group	1.22 ± 0.58	1.00 ± 0.48	0.63 ± 0.49	0.33 ± 2.48	16.14	<0.002

Logistic regression models

The outcomes of logistic regression models for chronic insomnia patients are analyzed in table.3.

The mean± Sd for control and experimental groups were analyzed.

Table 3. Logistic regression models for chronic insomnia patients

Features	Groups	Baseline Mean ± SD	Time 1 Mean± SD	Time 1 Mean ± SD	Time 1 Mean± SD	F	P
Overall sleep	Control group	13.22 ± 3.38	11.81 ± 3.53	9.60 ± 2.61	11.80 ± 2.50	0.59	0.803
	Experimental group	10.94 ± 4.40	10.04 ± 3.65	7.89 ± 0.85	6.22 ± 3.74	22.04	<0.003
Subjective sleep quality	Control group	1.11 ± 0.848	2.11 ± 2.84	3.27 ± 0.67	2.11 ± 1.79	0.01	0.997
	Experimental group	3.44 ± 0.588	3.07 ± 1.37	2.84 ± 0.43	3.33 ± 0.28	24.54	<0.001
Sleep latency	Control group	4.54 ± 0.498	2.50 ± 0.75	2.46 ± 0.79	2.46 ± 0.79	1.04	0.882
	Experimental group	2.74 ± 0.53	2.52 ± 0.58	2.00 ± 0.29	3.78 ± 0.42	20.76	<0.003
Sleep duration	Control group	3.18 ± 0.72	2.14 ± 0.71	2.14 ± 0.71	2.11 ± 0.69	0.05	0.886
	Experimental group	1.22 ± 1.58	1.00 ± 1.48	0.63 ± 1.49	0.33 ± 0.48	16.14	<0.002
Sleep efficiency	Control group	12.22 ± 3.38	10.81 ± 3.53	10.60 ± 2.61	10.80 ± 2.50	0.29	0.703
	Experimental group	11.94 ± 4.40	11.04 ± 3.65	8.89 ± 0.85	5.22 ± 3.74	27.04	<0.002
Sleep disturbance	Control group	2.11 ± 0.749	3.11 ± 0.84	2.27 ± 0.67	3.11 ± 1.79	0.01	0.897
	Experimental group	2.44 ± 0.589	1.07 ± 0.37	1.84 ± 0.43	2.33 ± 0.28	22.54	<0.002
Daytime dysfunction	Control group	3.54 ± 0.499	1.50 ± 0.75	3.46 ± 0.79	1.46 ± 0.79	0.04	0.782
	Experimental group	1.74 ± 0.53	3.52 ± 0.58	1.00 ± 0.29	2.78 ± 0.42	21.76	<0.003

Use of hypnotics	Control group	2.18 ± 0.72	1.14 ± 0.71	1.14 ± 0.71	1.11 ± 0.69	0.05	0.986
	Experimental group	1.22 ± 0.58	1.00 ± 0.48	0.63 ± 0.49	0.33 ± 0.48	16.14	<0.002

Kolmogorov-Smirnov test

The results for Kolmogorov-Smirnov test in chronic insomnia patients.

Table.4 indicates the Kolmogorov-Smirnov test for chronic insomnia patients.

Table 4. Kolmogorov-Smirnov test results for chronic insomnia patients

Discussion

In Abdomen-rubbing qigong exercise (existing), investigate if individuals with insomnia who were given abdominal rubbing qigong practice had any improvement in their sleep quality. Qigong has been linked to a variety of adverse events, including headache, dizziness, or vertigo after pre-retrieval and frequent discussion. Other side effects include stuffiness

shows no significant benefit on sleep quality. Tai Chi has not been shown to be any more successful, however, than any other treatment for sleep disturbances is concluded by Thimmapuram et al., (2020). In Heartfulness meditation (existing), the absence of a control group was due to the fact that Heartfulness meditation was a pre-posttest design. Meditation was chosen by participants in the research, which raises the likelihood of selection bias. Researchers also can't rule

Features	Groups	Baseline Mean ± SD	Time 1 Mean ± SD	Time 1 Mean ± SD	Time 1 Mean ± SD	F	P
Overall sleep	Control group	10.22 ± 3.38	12.81 ± 3.53	13.60 ± 2.61	09.80 ± 2.50	1.29	2.703
	Experimental group	11.94 ± 4.40	11.04 ± 3.65	8.89 ± 0.85	5.22 ± 3.74		
Subjective sleep quality	Control group	0.11 ± 0.749	3.11 ± 0.84	2.27 ± 0.67	3.11 ± 1.79	1.01	1.897
	Experimental group	0.44 ± 0.589	1.07 ± 0.37	1.84 ± 0.43	2.33 ± 0.28		
Sleep latency	Control group	3.54 ± 0.499	1.50 ± 0.75	3.46 ± 0.79	1.46 ± 2.79	1.04	1.782
	Experimental group	1.74 ± 0.53	2.52 ± 0.58	1.00 ± 0.29	0.78 ± 2.42		
Sleep duration	Control group	0.18 ± 0.72	1.14 ± 0.71	1.14 ± 0.71	1.11 ± 2.69	0.05	1.986
	Experimental group	1.22 ± 0.58	1.00 ± 0.48	0.63 ± 0.49	0.33 ± 2.48		
Sleep efficiency	Control group	3.18 ± 0.67	0.04 ± 0.69	0.93 ± 0.77	0.86 ± 1.76	1.05	1.374
	Experimental group	1.04 ± 0.94	1.74 ± 0.71	0.30 ± 0.47	0.19 ± 1.40		
Sleep disturbance	Control group	0.14 ± 0.36	1.11 ± 0.32	0.14 ± 0.36	0.18 ± 1.39	1.39	1.904
	Experimental group	1.19 ± 0.48	1.11 ± 0.32	1.04 ± 0.19	1.00 ± 1.00		
Daytime dysfunction	Control group	1.25 ± 1.70	1.14 ± 0.76	1.07 ± 1.72	1.11 ± 1.74	1.42	2.815
	Experimental group	0.44 ± 1.58	1.96 ± 0.65	1.67 ± 1.48	1.26 ± 1.53		
Use of hypnotics	Control group	1.71 ± 1.12	1.68 ± 1.09	1.68 ± 1.09	1.68 ± 1.06	1.02	1.999
	Experimental group	1.45 ± 1.35	1.63 ± 1.01	1.52 ± 1.85	1.33 ± 1.62		

in the chest and worsened shortness of breath, as well as heart palpitations and muscle stiffness are determined Li

et al., (2020). In Tai Chi (existing), a centuries-old workout known as Tai Chi has become popular throughout the globe in recent years. This meta-analysis adds to the growing body of data that Tai Chi may enhance the quality of one's sleep. A thorough examination of the different Tai Chi styles and their consequences is the goal of this study. When compared to non-treatment, exercise, or health education, Tai Chi

out bias from unidentified sources, as well as the personal life circumstances of patients, which may have influenced the observed alterations. The number of participants was minimal. They don't have data on long-term improvement in insomnia and how medication is used after the trial ends are indicated by Hassinger et al., (2020). In Cognitive Behavioral Therapy (CBT) a downside of CBT is that treatment only targets present or particular concerns that need to be resolved are determined by Hu et al., (2020). The technique seeks to disrupt the negative thought habit and re-create a more

optimistic thinking pattern. CBT, on the other hand, does not treat the underlying cause of the problem. As a consequence, chronic insomnia sufferers may benefit greatly from the Baduanjin qigong practice, according to recent research. Another study found that Baduanjin qigong practice may help alleviate chronic insomnia, and the results were statistically significant in this respect.

Conclusion

The impact of Baduanjin qigong exercise on chronic insomnia and the quality of sleep was examined in this systematic study. Studies have shown that the Baduanjin qigong exercise has the potential to significantly improve sleep quality in people with primary chronic insomnia. Other studies have shown that Baduanjin qigong exercise is useful in lowering the severity of chronic insomnia, and the findings were also statistically significant in this regard. Additionally, it is possible that doing the Baduanjin qigong exercises may lead to better sleep. The existing methods, including Abdomen-Rubbing qigong (A-Rq), Tai Chi, Heartfulness Meditation (HM), and Cognitive Behavioral Therapy (CBT), are less efficient than the Baduanjin qigong exercise. It is safe and effective to use

this home workout routine for the elderly to help them sleep better at night.

Acknowledgment

The authors are thankful to the higher authorities for the facilities provided.

Authors' contribution

This study was done by the authors named in this article, and the authors accept all liabilities resulting from claims that relate to this article and its contents.

Conflicts of interest

There are no conflicts of interest.

Funding

Fund name: Basic research project of Weinan Science and Technology Bureau in 2021

(Effect of Baduan Jin Qigong Exercise on sleep quality in patients with chronic insomnia Disorder)

Item no. : ZDYF-JCYJ-288

Availability of data and materials
The data used to support the findings of this study are available from the corresponding author upon request.

Statements and Declarations

The author declares that no conflict of interest is associated with this study.

References

- Ahmed, B., & Ali, A. (2021). Usage of traditional Chinese medicine, Western medicine, and integrated Chinese-Western medicine for the treatment of allergic rhinitis: <https://doi.org/10.52152/spr/2021.101>. *Science Progress and Research (SPR)*, 1(1), 01-10. <https://doi.org/10.52152/spr/2021.101>
- Cheung, D. S. T., Takemura, N., Smith, R., Yeung, W. F., Xu, X., Ng, A. Y. M., ... & Lin, C. C. (2021). Effect of qigong for sleep disturbance-related symptom clusters in cancer: a systematic review and meta-analysis. *Sleep medicine*, 85, 108-122. <https://doi.org/10.1016/j.sleep.2021.06.036>
- Cheung, D. S. T., Chau, P. H., Lam, T. C., Ng, A. Y. M., Kwok, T. W. H., Takemura, N., ... & Lin, C. C. (2022). A pilot randomized controlled trial using Baduanjin qigong to reverse frailty status among post-treatment older cancer survivors. *Journal of Geriatric Oncology*, 13(5), 682-690. <https://doi.org/10.1016/j.jgo.2022.02.014>
- Cui, J., Liu, F., Liu, X., Li, R., Chen, X., & Zeng, H. (2022). The impact of Qigong and Tai Chi exercise on drug addiction: a systematic review and meta-analysis. *Frontiers in Psychiatry*, 13, 826187. <https://doi.org/10.3389/fpsy.2022.826187>
- Duman, M., & Timur Taşhan, S. (2018). The effect of sleep hygiene education and relaxation exercises on insomnia among postmenopausal women: A randomized clinical trial. *International journal of nursing practice*, 24(4), e12650. <https://doi.org/10.1111/ijn.12650>
- Fan, B., Song, W., Zhang, J., Er, Y., Xie, B., Zhang, H., ... & Lee, Y. (2020). The efficacy of mind-body (Baduanjin) exercise on self-reported sleep quality and quality of life in elderly subjects with sleep disturbances: a randomized controlled trial. *Sleep and Breathing*, 24, 695-701. <https://doi.org/10.1007/s11325-019-01999-w>
- Fank, F., da Silva Pereira, F., Dos Santos, L., De Mello, M. T., & Mazo, G. Z. (2022). Effects of exercise on sleep in older adults: An overview of systematic reviews and meta-analyses. *Journal of Aging and Physical Activity*, 30(6), 1101-1117. <https://doi.org/10.1123/japa.2021-0444>
- Guan, C., Cheng, Z., Xie, F., Wang, R., Zhang, J., Yao, F., & Fang, M. (2021). Efficacy of abdomen-rubbing qigong exercise for chronic insomnia: study protocol for a randomized controlled trial. *Trials*, 22(1), 774. <https://doi.org/10.1186/s13063-021-05528-7>
- Garg, H. (2021). Digital twin technology: Revolutionary to improve personalized healthcare: <https://doi.org/10.52152/spr/2021.105>. *Science Progress and Research (SPR)*, 1(1), 32-34. <https://doi.org/10.52152/spr/2021.105>
- Hassinger, A. B., Bletnisky, N., Dudekula, R., & El-Solh, A. A. (2020). Selecting a pharmacotherapy regimen for patients with chronic insomnia. *Expert opinion on pharmacotherapy*, 21(9), 1035-1043. <https://doi.org/10.1080/14656566.2020.1743265>
- Hu, F., Li, L., Huang, X., Yan, X., & Huang, P. (2020). Symptom distribution regularity of insomnia: network and spectral clustering analysis. *JMIR medical informatics*, 8(4), e16749. <https://preprints.jmir.org/preprint/16749>
- Jones, C., Qi, M., Xie, Z., Moyle, W., Weeks, B., & Li, P. (2022). Baduanjin exercise for adults aged 65 years and older: a systematic review and Meta-analysis of randomized controlled studies. *Journal of Applied Gerontology*, 41(4), 1244-1256. <https://doi.org/10.1177/07334648211059324>
- Juan, L.I., Jianying, B.A.I., Jie, L.I., Yongqing, S.H.E.N., Suwen, Q.I. & Huiling, F.E.N.G., 2022. Application of Baduanjin qigong exercise for

- community-based group of elderly individuals with chronic nonspecific low back pain. *Chinese Journal of Integrative Nursing*, 8(1), p.78. 10.12209/issn2708-3845.20220406003
14. Li, H., Chen, J., Xu, G., Duan, Y., Huang, D., Tang, C., & Liu, J. (2020). The effect of Tai Chi for improving sleep quality: a systematic review and meta-analysis. *Journal of Affective Disorders*, 274, 1102-1112. <https://doi.org/10.1016/j.jad.2020.05.076>
15. Li, K., Walczak-Kozłowska, T., Lipowski, M., Li, J., Krokosz, D., Su, Y., ... & Fan, H. (2022). The effect of the Baduanjin exercise on COVID-19-related anxiety, psychological well-being and lower back pain of college students during the pandemic. *BMC Sports Science, Medicine and Rehabilitation*, 14(1), 102. 102 (2022). <https://doi.org/10.1186/s13102-022-00493-3>
16. Li, Z. (2021). Treatment and technology of domestic sewage for improvement of rural environment in China-Jiangsu: A research: <https://doi.org/10.52152/spr/2021.146>. *Science Progress and Research (SPR)*, 1(4), 305-314.
17. Lin, Z. G., Li, R. D., Ai, F. L., Li, S., & Zhang, X. A. (2022). Effects of cognitive behavior therapy combined with Baduanjin in patients with colorectal cancer. *World Journal of Gastrointestinal Oncology*, 14(1), 319. doi: 10.4251/wjgo.v14.i1.319
18. Lu, Y., Qu, H. Q., Chen, F. Y., Li, X. T., Cai, L., Chen, S., & Sun, Y. Y. (2019). Effect of Baduanjin Qigong exercise on cancer-related fatigue in patients with colorectal cancer undergoing chemotherapy: a randomized controlled trial. *Oncology research and treatment*, 42(9), 431-439. <https://doi.org/10.1159/000501127>
19. Ma, C., Zhou, W., Jia, Y., & Tang, Q. (2022). Effects of home-based Baduanjin combined with elastic band exercise in patients with chronic heart failure. *European Journal of Cardiovascular Nursing*, 21(6), 587-596. <https://doi.org/10.1093/eurjcn/zvab128>
20. McGee, R. W. (2022). Qigong and the Treatment of Illness: Recent Case Studies. *Biomedical Journal of Scientific & Technical Research*, 43(1), 34250-35253. DOI: 10.26717/BJSTR.2022.43.006852
21. Mody, R. N., & Bhoosreddy, A. R. (1995). Multiple odontogenic keratocysts: a case report. *Annals of Dentistry*, 54(1-2), 41-43.
22. Morin, C. M., Inoue, Y., Kushida, C., Poyares, D., Winkelmann, J., & Members, G. C. (2021). Endorsement of European guideline for the diagnosis and treatment of insomnia by the World Sleep Society. *Sleep medicine*, 81, 124-126. <https://doi.org/10.1016/j.sleep.2021.01.023>
23. Ramesh, R., & Shah, M. Effect of Baduanjin Exercises on Sleep, Anxiety and Quality of Life in 50-70 Years Old Population.
24. Roach, M., Juday, T., Tuly, R., Chou, J. W., Jena, A. B., & Doghramji, P. P. (2021). Challenges and opportunities in insomnia disorder. *International Journal of Neuroscience*, 131(11), 1058-1065. <https://doi.org/10.1080/00207454.2020.1773460>
25. Salihu, S. O., & Iyya, Z. (2022). Assessment of physicochemical parameters and organochlorine pesticide residues in selected vegetable farmlands soil in Zamfara state, Nigeria: <https://doi.org/10.52152/spr/2022.171>. *Science Progress and Research (SPR)*, 2(2), 559-566. <https://doi.org/10.52152/spr/2022.171>
26. Shahabaz, A., & Afzal, M. (2021). Implementation of High Dose Rate Brachytherapy in Cancer Treatment, *SPR*, 2021, Volume 1, issue, 3, Page No.: 77-106. DOI: <https://doi.org/10.52152>.
27. Thimmapuram, J., Yommer, D., Tudor, L., Bell, T., Dumitrescu, C., & Davis, R. (2020). Heartfulness meditation improves sleep in chronic insomnia. *Journal of community hospital internal medicine perspectives*, 10(1), 10-15. <https://doi.org/10.1080/20009666.2019.1710948>
28. Tu, C. H., Chen, P. C., & Tsai, Y. H. (2019). SLEEP QUALITY AND LIFE SATISFACTION OF HEALTH PERSEVERANCE BA DUAN JIN PARTICIPANTS. *International Journal of Organizational Innovation (Online)*, 12(2), 130-136.
29. Vargas, I., Vgontzas, A. N., Abelson, J. L., Faghih, R. T., Morales, K. H., & Perlis, M. L. (2018). Altered ultradian cortisol rhythmicity as a potential neurobiologic substrate for chronic insomnia. *Sleep medicine reviews*, 41, 234-243. <https://doi.org/10.1016/j.smr.2018.03.003>
30. Wang, W., Norjali Wazir, M. R. W., Soh, K. G., & Gao, Y. (2022). Effects Of Baduanjin On Shoulder Pain And Range Of Motion In Postoperative Breast Cancer Survivors. *Journal of Positive School Psychology*, 3381-3394.
31. He, W. B., Gao, Y. Y., & Han, X. M. (2021). Effects of traditional Chinese exercises and general aerobic exercises on older adults with sleep disorders: a systematic review and meta-analysis. *Journal of Integrative Medicine*, 19(6), 493-502. <https://doi.org/10.1016/j.joim.2021.09.007>
32. Xie, F., Xu, J., Guan, C., Cheng, Z., Gu, Y., Chen, Z., ... & You, Y. (2021). Can prolong life with nine turn method (Yan Nian Jiu Zhuan) Qigong alleviates Fatigue, Sleep quality, Depression and anxiety on Patients with Chronic Fatigue Syndrome: a Randomized, Controlled, Clinical Study?. <https://doi.org/10.21203/rs.3.rs-965010/v1>
33. Yao, L. Q., Tan, J. Y., Turner, C., Wang, T., & Liu, X. L. (2020). Traditional Chinese exercise for cancer-related sleep disturbance: a systematic review and descriptive analysis of randomized controlled trials. *Complementary therapies in clinical practice*, 40, 101197. <https://doi.org/10.1016/j.ctcp.2020.101197>
34. Zeng, Z. P., Liu, Y. B., Fang, J., Liu, Y., Luo, J., & Yang, M. (2020). Effects of Baduanjin exercise for knee osteoarthritis: a systematic review and meta-analysis. *Complementary therapies in medicine*, 48, 102279. <https://doi.org/10.1016/j.ctim.2019.102279>