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The effect of Baduanjin Qigong combined with five-elements music on anxiety and quality of sleep in asymptomatic patients with COVID-19 infection: A randomised controlled trial

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A B S T R A C T

Background: Infections of Coronavirus Disease-2019 (COVID-19) and the subsequent quarantine can culminate in anxious mood and sleep disturbances. The objective of this clinical trial was to investigate the effect of traditional Qigong with music therapy on relieving anxiety and improving the quality of sleep in Chinese adults with COVID-19 infection.
Methods: A total of 200 asymptomatic COVID-19 infected patients were randomly assigned into two groups during their quarantine period in Chongming Island, Shanghai. The patients in the treatment group daily received Baduanjin Qigong, five-elements music therapy and routine care, while the patients in the control group only took the routine care. The primary outcome was anxiety levels measured by the 7-item Generalized Anxiety Disorder scale (GAD-7). Secondary outcomes included the quality of sleep measured by the Jenkins Sleep Scale (JSS), the degree of depression measured by the Patient Health Questionnaire (PHQ-9), as well as the self-efficacy in the Perceived Health Competence Scale (PHCS). An online questionnaire was given to all participants on the day of arrival to determine the baseline for all outcomes and then given again on the day of discharge. A one-way analysis of covariance was used to analyze the differences between the two groups after intervention.
Results: At the end of the intervention, 177 (88.5%) patients finished the questionnaire. Patients in the treatment group had clearly decreased GAD-7 scores (MD = 2.7, 95% CI = 2.3, 3.2) after the daily exercise and music. Patients in the control group had little changes in the GAD-7 (MD = -0.2, 95%CI = -0.7, 0.3, P = 0.07), as well as the PHQ-9 (MD = 0.1, 95%CI = -0.5, 0.6, P = 0.66) after the routine care, when compared to their baseline scores. There were statistical between-group differences in GAD-7 (MD = 2.9, 95% CI = 2.2, 3.6, P < 0.001) and in the PHQ-9 scores (MD = 3.6, 95% CI = 2.9, 4.4, P < 0.001) at the post-treatment. Compared with the control group, patients had significantly lower scores on the JSS (MD = 2.7, 95% CI = 2.0, 3.3, P < 0.001), and higher scores on the PHCS (MD = -5.0, 95% CI = -6.1, -3.9, P < 0.001) after receiving Qigong and the music therapy.

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Conclusion: Traditional Baduanjin Qigong and five-elements music therapy help to relieve anxiety and depression, and improve the sleep quality in patients with COVID-19 infection.
Trial registration: Chinese Clinical Trial Registry ChiCTR2200059800.

1. Introduction

Residents of Shanghai have suffered the resurgence of the coronavirus disease 2019 (COVID-19) since March 2022. The outbreak was triggered by the highly infectious Omicron mutant strain, and was the most widespread wave, with the highest incidence rate of the COVID-19 aggregation in Shanghai as of the time of this writing. The dominant Omicron BA.2 sub-variant of the coronavirus conceals well and spreads quickly [1], showing multi-point dispersal, multiple chains, and with more community transmission, while with a short incubation period and no typical clinical symptoms. According to the Shanghai Municipal Health Commission, the newly infected cases reached peak at 27 605 on April 13. As of May 4, 593 336 cases were identified, including 538 450 asymptomatic carriers [2]. In this pandemic, the cumulative number of reported asymptomatic infections was much larger than the number of symptomatic cases [3]. As a result, the mobile cabin hospital compulsory quarantine for mild and asymptomatic patients was an important method of combating COVID-19 [4].

Though the asymptomatic COVID-19 patients have no or mild upper respiratory tract symptoms, they are always in a negative mood. Viral infections and the subsequent isolation and quarantine can quickly culminate into sleep disorders, anxiety, and depressive episodes [5,6]. Previous research suggested that nearly 50% of COVID-19 patients experienced anxiety or depression, and 34% of patients reported sleep disturbances [7]. With limited intervention methods in the cabin hospitals, practitioners in traditional Chinese medicine (TCM) sought alternative approaches such as acupuncture, herbal medicine, traditional exercise and music therapy to help patients relieve their negative emotions and calm their minds. Baduanjin Qigong, originated from the Southern Sung Dynasty, is a series of aerobic exercises believed to impart a silky quality to the body and its energy, and to improve general health [8,9]. It consists of 8 separate and smooth body movements with breathing, and focuses on improving body strength and psychological construction by developing balance of body and mind. As one of the most common forms of Chinese Qigong, Baduanjin exercise can help dredge meridians and regulate visceral functions to improve sleep quality and relieve bad mood [10,11]. Furthermore, it is easy to learn and practice without restrictions of equipment or field. The five-elements music therapy is another traditional way to adjust the five internal organs of the body and achieve the *Yin-Yang* balance based on the theory of TCM [12]. First recorded in The *Yellow Emperor's Classic of Medicine*, the five-elements music states that different elements (tones) of music can help treat different emotional disorders [13,14].

This clinical trial aimed to observe the effects of the traditional therapies on mood disorders and sleep problems, as well as their potential application in the treatment of COVID-19. To our knowledge, there were no similar clinical trials that applying Qigong and music as combined interventions to treat COVID-19 infected patients. The trial was set in the No.2 mobile cabin hospital in Chongming Island, which was converted from a factory building in an industrial estate, with 3 enclosed floors, 10 regions in each floor and 40 beds in each region. Patients' basic needs, including food, toiletries, personal hygiene products, bedding and daily medication were met on their arrival of the hospital. Doctors and nurses gave detailed health education to the patients and gave them the routine treatment for their symptoms as well. We hypothesized that compared with the standard care only, the traditional Baduanjin exercise with the five-elements music therapy had better effects on relieving patients' anxious mood and improving quality of sleep among the COVID-19 infected patients.

2. Methods

2.1. Study design

We conducted this randomised controlled clinical trial, complying with the guidelines prescribed by the Consolidated Standards of Reporting Trials (CONSORT) checklist. Patients were recruited and randomly assigned to either the treatment group or the control group after signing the consent form. All the assessors were blinded to the group assignment. Patients in both groups received the same routine care, and patients in the treatment group were asked to perform the daily Qigong exercise and take the music therapy. The interventions continued daily during every patient's hospitalization in the mobile cabin. All participants were asked to scan a QR code link issued by the investigator to complete the questionnaire as outcome measurements. Outcomes were evaluated twice during the trial, once on the day of arriving as baseline and another on the day of leaving the cabin hospital after two negative COVID-19 nucleic acid reports. The researchers should explain the questions for the patients at baseline if necessary. Nurses, statisticians, and other researchers had no communication with each other to ensure the principle of task separation during the trial.

2.2. Participants

A total of 200 asymptomatic patients with COVID-19 infection were recruited from May 12 to May 18, 2022 in the mobile cabin hospital in Chongming Island, Shanghai. Eligible patients were randomly assigned at a ratio of 1:1 into either the treatment group or the control group. The inclusion criteria were (1) male or female aged from 18 to 60; (2) with positive nucleic acid test of COVID-19 by RT-PCR within the previous 48 h; (3) patients had no clinically identifiable symptoms including high fever, cough, fatigue, sore throat,

decreased sense of smell (or taste), diarrhea, etc.; (4) patients had no imaging features of COVID-19 by chest CT scan; (5) patients voluntarily took part in the trial and signed the informed consent form.

The Exclusion criteria were (1) asymptomatic infected patients in recovery period; (2) patients whom had taken non-drug TCM therapy before enrollment; (3) patients with severe hepatic or renal insufficiency or cardiovascular disease; (4) patients physically unable to complete the Qigong exercises; (5) patients with mental illness or impaired consciousness.

2.3. Intervention

2.3.1. The treatment group

Patients in the treatment group performed the daily Baduanjin Qigong and received five-elements music therapy, in addition to their routine care during their recovery period in the cabin hospital.

2.3.2. Baduanjin exercise

Trained nurses provided one-on-one guidance to patients to help them learn the Baduanjin Qigong exercise on the first day of participating in the trial, and the training scheme was in accordance with the Health Qigong—Baduanjin published by the General Administration of Sport of China. Exercise videos and materials were sent to patients as well, so that patients could master the exercise methods through practice as soon as possible. The simple body movements of Baduanjin Qigong can be broken down into 8 exercises that focus on different physical areas and meridians [15]. Patients in this study practiced the standing version that is the most widely practiced, including 'Two Hands Hold up the Heavens' to regulate Sanjiao meridian, 'Drawing the Bow to Shoot the Eagle' to exercise the waist area, 'Separate Heaven and Earth' to stimulate stomach meridian, 'Sway the Head and Shake the Tail' to remove excess heart fire, and 'Two Hands Hold the Feet' to strengthen the Kidney meridian, etc. Besides that, patients were instructed to use abdominal breathing requiring the deep, long, soft and even breath in Dantian, with diaphragmatic and thoracic movements to promote the inhalation of more fresh air and the exhalation of residual turbid air to improve lung function. It always takes about 10–15 min for patients to complete a set of Baduanjin Qigong. During the intervention period, patients were asked to perform a 30-min session of exercise twice a day, at 10:00 a.m. and 4:00 p.m., consisting of 2–3 sets of Baduanjin each time.

2.3.3. Five-elements music therapy

Patients in the treatment group were arranged centrally in 3–4 regions of the first or third floor to took the music therapy four times a day during the intervention period. Patients in the control group were arranged hospitalization in the second floor in case the music interrupting them. The five-elements music therapy in this trial was the Medium Tune (Zhengdiao) based on the theory of Yin-Yang and the resonance of the five tones through the five organs. Under the guidance of TCM syndrome differentiation and treatment, the five-elements music comprising five tones—Gong, Shang, Jiao, Zhi and Yu, are believed to be connected with five internal organs (spleen, lung, liver, heart, kidney) and the five emotions (anxiety, worry, anger, joy and fear) [16]. A good combination of the five tones can help balance the Yin-Yang and maintain the human body in a state of equilibrium. 'Plum-Blossom in three Movements' played by Guqin, a seven-stringed plucked instrument, was broadcast at 7:00 a.m. every day to store the kidney qi. The Yu tone here is equivalent to '6' in the numbered musical notation, having the character of water and can nourish the kidney yin. 'White Snow in Early Spring' and 'Parting Tune with Repeated Refrain' in Shang tone, with the character of metal to moisten the lung, were played at 3:00 p.m. 'Song at the Frontier', a traditional Pipa music, consists of 5 sections and 68 bars for each section. It mainly contains the Shang tone and part of Yu tone, and the two tones merge together as a vibrant melody with the character of wood. The music was broadcast at 7:00 p.m. to help soothe the liver qi. 'Daughter's Love' was played by Zheng (Chinese zither) with the lively Zhi tone, starting at 9:00 p.m. to clear the heart fire. The five-element music was played by the researchers on time with 2 Bluetooth speakers (Sony, SRS-XB23) linked to the laptop in each floor. The volume was kept below 50 dB for 30 min each time. Patients were instructed to rest in a supine position, with eyes lightly closed when taking the music therapy. The nurses guided them to imagine something beautiful, to keep them in a cheerful mood and to achieve harmony and peace.

2.3.4. The control group

Patients in the control group received routine care during their recovery period in the cabin hospital. Nurses carried out the routine care, including the basic nursing, medication nursing, psychological care, exercise rehabilitation instruction and health education. Nurses cared about their mental health during the daily check-ups, as well. Patients were instructed to take their routine medication for underlying diseases, including hypertension, diabetes, and coronary heart disease, etc. They were encouraged to do their individual routine exercises without rigid restrictions.

2.4. Outcome measurement

The baseline characteristics including age bracket, gender, education background, occupation, whether was vaccinated and whether had symptoms of infection or not, were collected on the first day of patients' arrival if they agreed to participate into the trial.

The primary outcome was anxiety, as measured by score on the 7-item Generalized Anxiety Disorder scale (GAD-7), which reflected the severity of self-reported anxiety in the past two weeks [17]. The total score ranged from zero to 21, with a higher score indicating greater self-reported anxiety. Scores of 5, 10 and 15 represent cut-off points for mild, moderate and severe anxiety, respectively. Previous study showed that The Cronbach's coefficient for the Chinese version of GAD-7 was 0.90, which indicated that it has good reliability and was suitable for the assessment of anxiety disorders in Chinese population [18].

The secondary outcomes included the quality of sleep measured by the Jenkins Sleep Scale (JSS), depression as measured by mean scores on the Patient Health Questionnaire (PHQ-9), as well as their self-efficacy regarding general health-related behavior evaluated by the Perceived Health Competence Scale (PHCS). In JSS, patients were inquired about the frequency of the following problems during the past month: difficulty to fall asleep, wake up at night, difficulty to stay asleep and non-restorative sleep [19]. The patient with a score of >11 was considered to have a high frequency of sleep disturbances. The PHQ-9 is based on the diagnostic criteria for depression from the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), with a total score of ≥10 indicating possible major depression [20]. Meta-analysis of the accuracy of diagnostic tests by the PHQ-9 showed a combined sensitivity of 0.88 and specificity of 0.89, indicating that the PHQ-9 can be used as a screening tool for primary screening of depression in Chinese population [21]. PHCS was developed to measure a more generalized construct that is specific to the health domain but not to any particular health behavior. The PHCS consists of 6 items, and each item is rated on a 4-point Likert scale ranging from 1 (not at all capable) to 4 (very capable). The total score of the PHCS is calculated by summing the scores of all 6 items, with higher scores indicating a higher level of perceived health competence. Perceived health competence is the degree to which a person believes in their ability to alter or control health outcomes [22]. Good perception of competence in physical and mental health is also associated with health information-seeking behaviors, and better medication adherence.

All the outcomes were evaluated on the first day the patients arrived at the mobile cabin hospital as baseline and again at the time they left the hospital with the full recovery from COVID-19.

2.5. Sample size calculation

The sample size of this trial was calculated by comparing the means of two independent samples with equal-variance *t*-test by the software PASS 15.0. Based on the result of a previous small-sample clinical trial that studied the effect of Baduanjin Qigong on patients with COVID-19, the mean between-group difference score of GAD-7 was 1.7 (SD = 3.8) points after the one-week intervention period [23]. And thus, the sample size should be 80 for each to detect the difference between two intervention groups, with an α-error of 0.05 (two-sided) and a power of 80%. Allowing a drop-out rate of 20%, we decided that 200 patients needed to be recruited, with 100 patients in each group.

2.6. Randomization

Patients who were interested in participating in this trial were asked to be interviewed first. The random allocation sequence was generated through IBM SPSS Statistics for Windows (Version 24.0) (Armonk, NY: IBM Corp.) by an independent researcher and placed in opaque sealed envelopes to ensure the allocation concealment. The nurses opened the envelopes in the order of the screened patients and then told them about the group assignment before the first day of intervention.
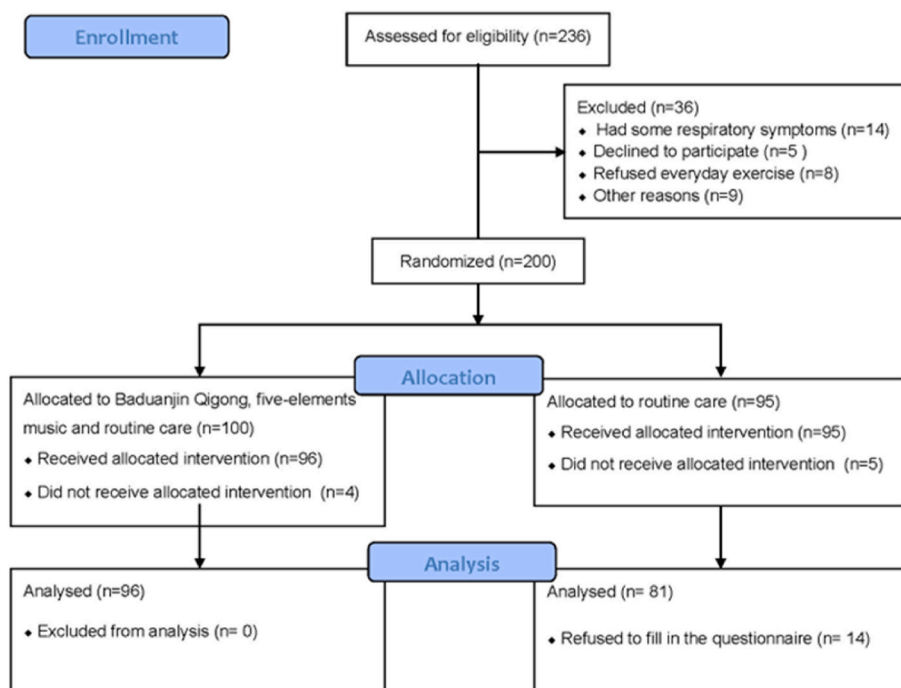

Fig. 1. CONSORT flow.

2.7. Statistical analysis

The data analysis was conducted by the statistician with SAS software (Version 9.4) (Cary, NC: SAS Institute Inc.). Measurement values were expressed as mean ± standard deviation (SD), using a t-test or Wilcoxon Rank Sum test to compare the between-group differences at baseline. For categorized data, the number of cases and percentages was calculated, and Pearson's chi-square analysis or Fisher's exact test were also used. A one-way analysis of covariance (ANCOVA) with baseline measure as covariate was used to investigate differences between the two groups at post-treatment. The significance level used for statistical analysis with 2-tailed testing was 5%.

3. Results

3.1. Characteristics of participants

236 asymptomatic patients with COVID-19 had interest in participating in the trial and were screened with the inclusion criteria. Due to several reasons (details seen in Fig. 1), 200 patients were recruited and randomly assigned into two groups at the ratio of 1:1. During the study, 4 patients in the treatment group dropped from the trial mainly because of the unsatisfactory effect; and 19 patients in the control group did not complete the exit survey when leaving the mobile cabin hospital. Among them, 5 patients were referred to the designated hospitals for further treatment and the remaining 14 patients refused to take the questionnaire again. Other patients completed the study without severe adverse events. Patients in the treatment group had an average hospitalization time of 6.3 (1.2) days, and those in the control group stayed for 6.4 (1.3) days.

A baseline survey of the demographic characteristics, anxiety level and quality of sleep of the participants was collected before intervention, and the features of the two groups are presented in Table 1.

3.2. Outcomes

3.2.1. Anxiety and depression

Table 2 and Fig. 2 show the GAD-7 scores of both groups, and the results were analyzed to reveal changes from baseline to post-treatment. One-way ANCOVA adjusted for baseline scores indicated that compared with the control group, patients in the treatment group had significant lower GAD-7 scores after the daily intervention (MD = 2.9, 95% CI = 2.2, 3.6, P < 0.001) with an effect size = 0.70. Fig. 2A shows the GAD-7 scores of the treatment group at baseline and at post-treatment, and Fig. 2B shows those of the control group. At post-treatment, patients who had taken the Baduanjin exercise and the five-elements music therapy had a lower GAD-7 score than baseline (MD = 2.7,95% CI = 2.3, 3.2, P < 0.001), while patients who only took the routine care had no difference in GAD-7 before and after the intervention (P = 0.07 > 0.05).

The results also showed that there was a statistically significant between-group variation in the post-treatment PHQ-9 score (details can be seen in Table 2). Patients in the treatment group had lower PHQ-9 scores than those in the control group (MD = 3.6, 95% CI = 2.9, 4.4, P < 0.001, effect size = 0.35). Compared with the baseline score, they had a clear decrease in the PHQ-9 (MD = 3.7, 95% CI = 3.2, 4.2, P < 0.001) after the observation period. There was no statistical difference in the PHQ-9 of the control group when compared with the baseline (P = 0.66 > 0.05).

Table 1
Demographic characteristics of the patients.

Characteristic		Treatment group (n = 96)	Control group (n = 81)
Age, n (%)	18–40 years old	60 (62.5%)	54 (66.7%)
	41–60 years old	36 (37.5%)	27 (33.3%)
Gender, n (%)	Male	60 (62.5%)	51 (63.0%)
	Female	36 (37.5%)	30 (37.0%)
Marriage, n (%)	Married	58 (60.4%)	50 (61.7%)
	Not married	31 (32.3%)	28 (34.6%)
	Divorced/widowed	7 (7.3%)	3 (3.7%)
Education, n (%)	Graduate	0 (0%)	1 (1.23%)
	Undergraduate	20 (20.8%)	20 (24.7%)
	High school and below	76 (79.2%)	60 (74.1%)
Occupation, n (%)	On job	49 (51.0%)	46 (56.8%)
	Retired	47 (49.0%)	35 (43.2%)
Vaccination, n (%)	Y	92 (95.8%)	75 (92.6%)
	N	4 (4.2%)	6 (7.4%)
Symptoms, n (%)	Y	49 (60.5%)	60 (62.5%)
	N	32 (39.5%)	36 (37.5%)
Perceived Health Competence Scale, mean (SD)		19.3 (7.2)	20.6 (7.8)
Brief Health Literacy Screen, mean (SD)		6.3 (3.7)	8.5 (3.7)
Generalized Anxiety Disorder-7, mean (SD)		4.2 (4.8)	1.9 (2.8)
Patient Health Questionnaire-9, mean (SD)		5.6 (5.3)	3.9 (3.4)
Jenkins Sleep Scale, mean (SD)		4.5 (4.0)	3.7 (4.0)

Table 2
Patients' Mood Changes Between Baseline and Post-treatment, mean (SD).

Outcomes	Group	Baseline	Post-treatment	Difference (95% CI)	P value
GAD-7	Treatment group	4.2 (4.8)	0.8 (2.3)	2.7 (2.3, 3.2)	<0.001
	Control group	1.9 (2.8)	2.5 (3.3)	−0.2 (−0.7, 0.3)	0.07
	Treatment vs. Control			2.9 (2.2, 3.6)	<0.001
PHQ-9	Treatment group	5.6 (5.3)	1.4 (2.7)	3.7 (3.2, 4.2)	<0.001
	Control group	3.9 (3.4)	4.0 (4.1)	0.1 (−0.5, 0.6)	0.66
	Treatment vs. Control			3.6 (2.9, 4.4)	<0.001

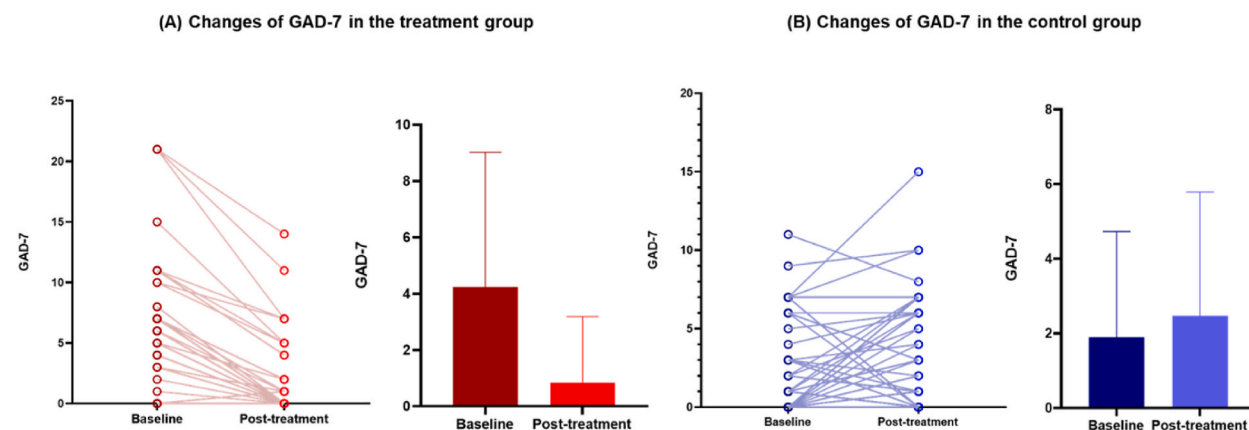GAD-7, General Anxiety Disorder-7; PHQ-9, Patient Health Questionnaire-9.

Fig. 2. Changes of GAD-7 in two groups
AA GAD-7 scores of the treatment group at baseline and post-treatment
BGAD-7 scores of the control group at baseline and post-treatment.

3.2.2. Quality of sleep

The changes in patients' quality of sleep are shown in Table 3. Compared to baseline, patients in the treatment had a lower score on the JSS after treatment (MD = 2.8, 95% CI = 2.3, 3.2, $P < 0.01$); while those in the control group had no changes (MD = 0.1, 95% CI = −0.4, 0.6, $P = 0.91 > 0.05$). Compared with the control group, patients had significantly lower scores on the JSS ($P < 0.001$, effect size = 0.32), which indicated their better quality of sleep after receiving the traditional Qigong and the music therapy.

3.2.3. Self-efficacy

Table 4 shows the changes in patients' self-efficacy evaluated by the PHCS. At post-intervention, patients in the treatment group had much higher scores on the PHCS (24.0 ± 6.2) than those in the control group (20.0 ± 7.5). There was a statistical difference (MD = −5.0, 95% CI = −6.1, −3.9, $P < 0.001$, effect size = 0.28) between the two groups in patients' perception of health.

4. Discussion

This clinical trial showed that for patients with COVID-19, the TCM therapies plus routine care had significantly lower scores on the GAD-7, PHQ-9 and JSS during the intervention period when compared with routine care only. Besides, patients' perception of health was greatly improved after taking the traditional Qigong and music therapy.

COVID-19 affected people's physical and mental health, quality of life, and even social stability. The stress of crisis may change the body's autonomic nervous system and neuroendocrine system, resulting in strong emotional experiences [24]. Due to the suddenness, complexity and persistence of the COVID-19 pandemic, it may cause people to bear huge psychological pressure, and lead to insomnia, anxiety, depression and other negative emotions [25]. Though nearly 90% of the infections were asymptomatic, with no or few respiratory symptoms in this coronavirus outbreak in Shanghai, these patients were at risk of developing mental health disorders

Table 3
Patients-Reported Assessments Between Baseline and Post-treatment, mean (SD).

Outcomes	Group	Baseline	Post-treatment	Difference (95% CI)	P value
Jenkins Sleep Scale	Treatment group	4.5 (4.0)	1.5 (2.4)	2.8 (2.3, 3.2)	<0.001
	Control group	3.7 (4.0)	3.7 (3.9)	0.1 (−0.4, 0.6)	0.91
	Treatment vs. Control			2.7 (2.0, 3.3)	<0.001

Table 4
Changes of Patients' self-efficacy Between Baseline and Post-treatment, mean (SD).

Outcomes	Group	Baseline	Post-treatment	Difference (95% CI)	P value
PHCS	Treatment group	19.3 (7.2)	24.0 (6.2)	−4.4 (−5.2, −3.6)	<0.001
	Control group	20.6 (7.8)	20.0 (7.5)	0.6 (−0.3, 1.4)	0.17
	Treatment vs. Control			−5.0 (−6.1, −3.9)	<0.001

PHCS, Perceived Health Competence Scale.

during the isolation period in the mobile cabin hospital. Pandemic anxiety is closely associated with the patients' high intolerance of uncertainty. Neural correlates of uncertainty activated specific brain areas, including amygdala, dorsolateral prefrontal cortex, and orbitofrontal cortex, broke the balance in these neural circuits, and thus caused anxiety [26]. Previous study showed that no significant differences were observed between fluvoxamine and placebo as for the treatment of the neuropsychological manifestations caused by COVID-19 syndrome [27]. With limited medical resources, Chinese medicine, which specializes in nourishing and strengthening the body and is easily accessible, can play an important role in treating people with COVID-19 infections.

TCM was used in the prevention and treatment process at the beginning of the spread of the COVID-19, and has achieved good results [28]. The World Health Organization (WHO) affirmed the effectiveness and safety of TCM in the treatment of COVID-19 infection but more rigorous clinical evidence was needed [29]. Baduanjin Qigong is a traditional Chinese mind-body exercise routine, characterized by slow, coordinative, and sequential movements [30]. It has been improved and standardized by the General Administration of Sport of China since 2004, and is currently popular throughout the country. Baduanjin strengthens the muscles and bones, harmonizes the qi and blood, and improves the function of the body and internal organs, thus achieving the purpose of strengthening the body and eliminating diseases. Previous studies indicated Baduanjin as an effective intervention for improving physical and psychological health outcomes among patients with osteoporosis [31], chronic fatigue syndrome [32] and cancer survivors [33]. During this trial, its effect in relieving anxiety and promoting sleep quality was proved among patients with COVID-19 infection. Moderate intensity exercise is beneficial for the normal functioning of the immune system and likely lower the risk of respiratory infection/illness [34]. The Baduanjin's effect may also be due to enhanced levels of serum melatonin, which plays important role in modulating emotions and regulating sleep–wake rhythm [35].

Music can facilitate relaxation by masking environmental noises and refocusing a person's attention on a more pleasant emotional state. Music and TCM theory are considered connected and comparable with each other, and both are regarded as the basis of self-cultivation and therapies for health and longevity [36]. Positive effects on mood regulation were reported in studies across all music activity categories, and reductions in anxiety were commonly reported in the music listening categories [37]. Previous study showed that five-element music therapy can effectively improve the sleep quality among patients with chronic obstructive pulmonary disease (COPD) accompanied by anxiety [38]. Animals test also found that the five-elements music could improve the behavior of rats by regulating glutamatergic and GABAergic, which provided a scientific basis for its intervention in neuropsychiatric diseases [39]. The five different songs in five time periods were carefully chosen to enhance the functions of the five *zang* organs in this trial. The concept of the five elements guides the entire system of Chinese music, and the five musical tones impact the corresponding organs because of the complicated interaction among the five musical tones, *zang* organs and elements [40].

We were satisfied with the patients' changes in emotions and sleep quality after about 7-day intervention during the trial. Patients tended to have full recovery in body and mind before discharge. Based on the results, we would further promote these traditional exercise and music therapy to benefit more COVID-19 infected patients.

There are some limitations in this trial. First, there was no blind method applied due to the intervention style, and thus patients in the control group were less cooperative, with a higher dropout rate. A waitlist group could be set as control for better compliance among patients in our future study. In addition, the outcomes were all self-reported scores and did not have a follow-up phase, which might also weaken this study's conclusions. The data collected was not comprehensive due to the limited resources and various influencing factors in the mobile cabin hospital. These potential confounding factors and sources of error that were not controlled for in the study may have impacts on the results. In future studies, measurements with some wearable devices can be applied to give objective results for the quality of sleep. Outcomes including quality of life with 36-item Short-form Health Survey can be evaluated, as well as some blood tests to further exploring the potential mechanism of the anxiolytic effect of these traditional interventions. Besides, a large sample-size trial with a follow-up period after patients' quarantine may provide more meaningful results.

5. Conclusion

Based on the researchers' medical background in TCM, we conducted this clinical trial to explore the potential effects of traditional complementary therapies on treating patients' adverse emotions and sleep disorders during their quarantine period caused by COVID-19 infection. The results showed Baduanjin Qigong and the five-elements music therapy may help to relieve anxiety and depression, improve sleep quality, and promote the perception of health in asymptomatic patients with COVID-19. We believe these interventions could be promoted for patients isolated at home as regular exercise and pastimes as well to achieve fast recovery and to maintain good physical and mental health.

Ethics statement

Ethical approval was obtained from the Ethics Committee of Shanghai Municipal Hospital of Traditional Chinese Medicine (2022SHL-KY-20-02). Written informed consent was obtained from all patients prior to their enrolment. Their personal data was kept confidential, and they could withdraw from the trial at any time without affecting treatment or care. The study complied with the Declaration of Helsinki.

Author contribution statement

Xian Wang: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.
Xuan Yin: Conceived and designed the experiments; Wrote the paper.
Ping Liu: Contributed reagents, materials, analysis tools or data.
Anzi Wang; Wenfeng Mu: Analyzed and interpreted the data.
Jun Xu; Weiyan Lu; Zhuping Chen; Yan Zhou: Performed the experiments.
Shifen Xu: Conceived and designed the experiments.
Yan Wang: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data.

Data availability statement

Data will be made available on request.

Additional information

No additional information is available for this paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

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