

World Journal of *Clinical Cases*

World J Clin Cases 2021 October 16; 9(29): 8627-8952



Contents

Thrice Monthly Volume 9 Number 29 October 16, 2021

REVIEW

- 8627 Time to give up traditional methods for the management of gastrointestinal neuroendocrine tumours
Yozgat A, Kekilli M, Altay M

MINIREVIEWS

- 8647 Healthcare practice strategies for integrating personalized medicine: Management of COVID-19
Liu WY, Chien CW, Tung TH
- 8658 Clinical application of repetitive transcranial magnetic stimulation for post-traumatic stress disorder: A literature review
Cheng P, Zhou Y, Xu LZ, Chen YF, Hu RL, Zou YL, Li ZX, Zhang L, Shun Q, Yu X, Li LJ, Li WH
- 8666 Pros and cons of continuous glucose monitoring in the intensive care unit
Sun MT, Li IC, Lin WS, Lin GM

ORIGINAL ARTICLE

Clinical and Translational Research

- 8671 Prognostic implications of ferroptosis-associated gene signature in colon adenocarcinoma
Miao YD, Kou ZY, Wang JT, Mi DH

Retrospective Study

- 8694 Cefoperazone sodium/sulbactam sodium *vs* piperacillin sodium/tazobactam sodium for treatment of respiratory tract infection in elderly patients
Wang XX, Ma CT, Jiang YX, Ge YJ, Liu FY, Xu WG
- 8702 Modified Gant procedure for treatment of internal rectal prolapse in elderly women
Xu PP, Su YH, Zhang Y, Lu T
- 8710 Clinical and imaging features of desmoid tumors of the extremities
Shi Z, Zhao XM, Jiang JM, Li M, Xie LZ
- 8718 Retrospective analysis of surgically treated pT4b gastric cancer with pancreatic head invasion
Jin P, Liu H, Ma FH, Ma S, Li Y, Xiong JP, Kang WZ, Hu HT, Tian YT
- 8729 Development of a random forest model for hypotension prediction after anesthesia induction for cardiac surgery
Li XF, Huang YZ, Tang JY, Li RC, Wang XQ

Clinical Trials Study

- 8740** Effects of mindful breathing combined with sleep-inducing exercises in patients with insomnia
Su H, Xiao L, Ren Y, Xie H, Sun XH

Observational Study

- 8749** Chronic hepatitis-C infection in COVID-19 patients is associated with in-hospital mortality
Ronderos D, Omar AMS, Abbas H, Makker J, Baiomi A, Sun H, Mantri N, Choi Y, Fortuzi K, Shin D, Patel H, Chilimuri S
- 8763** Midazolam dose is associated with recurrence of paradoxical reactions during endoscopy
Jin EH, Song JH, Lee J, Bae JH, Chung SJ

CASE REPORT

- 8773** Isolated mass-forming IgG4-related sclerosing cholangitis masquerading as extrahepatic cholangiocarcinoma: A case report
Song S, Jo S
- 8782** *Samonella typhi* infection-related appendicitis: A case report
Zheng BH, Hao WM, Lin HC, Shang GG, Liu H, Ni XJ
- 8789** ACTA2 mutation is responsible for multisystemic smooth muscle dysfunction syndrome with seizures: A case report and review of literature
Yang WX, Zhang HH, Hu JN, Zhao L, Li YY, Shao XL
- 8797** Whole-genome amplification/preimplantation genetic testing for propionic acidemia of successful pregnancy in an obligate carrier Mexican couple: A case report
Neumann A, Alcantara-Ortigoza MA, González-del Angel A, Zarate Díaz NA, Santana JS, Porchia LM, López-Bayghen E
- 8804** Is mannitol combined with furosemide a new treatment for refractory lymphedema? A case report
Kim HS, Lee JY, Jung JW, Lee KH, Kim MJ, Park SB
- 8812** Successful treatment of floating splenic volvulus: Two case reports and a literature review
Sun C, Li SL
- 8820** Removal of "ruptured" pulmonary artery infusion port catheter by pigtail catheter combined with gooseneck trap: A case report
Chen GQ, Wu Y, Zhao KF, Shi RS
- 8825** Isolated neutropenia caused by copper deficiency due to jejunal feeding and excessive zinc intake: A case report
Ohmori H, Kodama H, Takemoto M, Yamasaki M, Matsumoto T, Kumode M, Miyachi T, Sumimoto R
- 8831** Diagnosis and treatment of eosinophilic fasciitis: Report of two cases
Song Y, Zhang N, Yu Y
- 8839** Familial left cervical neurofibromatosis 1 with scoliosis: A case report
Mu X, Zhang HY, Shen YH, Yang HY

- 8846** Successful treatment after toxic epidermal necrolysis induced by AZD-9291 in a patient with non-small cell lung cancer: A case report
Li W, He X, Liu H, Zhu J, Zhang HM
- 8852** Anesthesia management in a pediatric patient with Becker muscular dystrophy undergoing laparoscopic surgery: A case report
Peng L, Wei W
- 8858** Diagnosis of upper gastrointestinal perforation complicated with fistula formation and subphrenic abscess by contrast-enhanced ultrasound: A case report
Qiu TT, Fu R, Luo Y, Ling WW
- 8864** Adenomyoepithelioma of the breast with malignant transformation and repeated local recurrence: A case report
Oda G, Nakagawa T, Mori M, Fujioka T, Onishi I
- 8871** Primary intracranial synovial sarcoma with hemorrhage: A case report
Wang YY, Li ML, Zhang ZY, Ding JW, Xiao LF, Li WC, Wang L, Sun T
- 8879** Lumbar infection caused by *Mycobacterium paragordoniae*: A case report
Tan YZ, Yuan T, Tan L, Tian YQ, Long YZ
- 8888** Primary intratracheal neurilemmoma in a 10-year-old girl: A case report
Wu L, Sha MC, Wu XL, Bi J, Chen ZM, Wang YS
- 8894** Ovarian pregnancy rupture following ovulation induction and intrauterine insemination: A case report
Wu B, Li K, Chen XF, Zhang J, Wang J, Xiang Y, Zhou HG
- 8901** Delayed diagnosis of imperforate hymen with huge hematocolpometra: A case report
Jang E, So KA, Kim B, Lee AJ, Kim NR, Yang EJ, Shim SH, Lee SJ, Kim TJ
- 8906** Acute pancreatitis with hypercalcemia caused by primary hyperparathyroidism associated with paraneoplastic syndrome: A case report and review of literature
Yang L, Lin Y, Zhang XQ, Liu B, Wang JY
- 8915** Use of a modified tracheal tube in a child with traumatic bronchial rupture: A case report and review of literature
Fan QM, Yang WG
- 8923** Isolated liver metastasis detected 11 years after the curative resection of rectal cancer: A case report
Yonenaga Y, Yokoyama S
- 8932** Severe bleeding after operation of preauricular fistula: A case report
Tian CH, Chen XJ
- 8938** Secondary aorto-esophageal fistula initially presented with empyema after thoracic aortic stent grafting: A case report
Wang DQ, Liu M, Fan WJ

- 8946** Disruption of sensation-dependent bladder emptying due to bladder overdistension in a complete spinal cord injury: A case report

Yoon JY, Kim DS, Kim GW, Won YH, Park SH, Ko MH, Seo JH

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Jjiang-Huei Jeng, DDS, PhD, Professor, School of Dentistry and Department of Dentistry, National Taiwan University Medical College and National Taiwan University Hospital, School of Dentistry, College of Dental Medicine, Kaohsiung Medical University, Taipei 100, Taiwan. jhjeng@ntu.edu.tw

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for *WJCC* as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The *WJCC*'s CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Jia-Hui Li; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lei Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

October 16, 2021

COPYRIGHT

© 2021 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Clinical Trials Study

Effects of mindful breathing combined with sleep-inducing exercises in patients with insomnia

Hui Su, Li Xiao, Yue Ren, Hui Xie, Xiang-Hong Sun

ORCID number: Hui Su 0000-0002-8068-7951; Li Xiao 0000-0001-9479-2739; Yue Ren 0000-0003-2794-9083; Hui Xie 0000-0003-2799-2903; Xiang-Hong Sun 0000-0001-8574-9413.

Author contributions: Su H and Sun XH designed the research study; Su H, Xiao L and Ren Y performed the research; Su H, Xie H, and Sun XH analyzed the data and wrote the manuscript; All authors have read and approve the final manuscript.

Institutional review board

statement: The study was reviewed and approved by the Shengjing Hospital of China Medical University (approval No 2019PS582K).

Clinical trial registration statement:

The study is registered at Chinese Clinical Trial Registry. The registration identification number is: ChiCTR2100049927 and URL for the registry is: <https://www.chictr.org.cn/showproj.aspx?proj=131839>.

Informed consent statement: All study participants, or their legal guardian, provided informed written consent prior to study enrollment.

Conflict-of-interest statement: No

Hui Su, Li Xiao, Yue Ren, Hui Xie, Xiang-Hong Sun, Sleep Medicine Center, Shengjing Hospital of China Medical University, Shenyang 110004, Liaoning Province, China

Corresponding author: Xiang-Hong Sun, MD, Chief Nurse, Sleep Medicine Center, Shengjing Hospital of China Medical University, No. 36 Sanhao Street, Shenyang 110004, Liaoning Province, China. 750019113@qq.com

Abstract

BACKGROUND

Insomnia is the most common sleep disorder. It disrupts the patient's life and work, increases the risk of various health issues, and often requires long-term intervention. The financial burden and inconvenience of treatments discourage patients from complying with them, leading to chronic insomnia.

AIM

To investigate the long-term home-practice effects of mindful breathing combined with a sleep-inducing exercise as adjunctive insomnia therapy.

METHODS

A quasi-experimental design was used in the present work, in which the patients with insomnia were included and grouped based on hospital admission: 40 patients admitted between January and April 2020 were assigned to the control group, and 40 patients admitted between May and August 2020 were assigned to the treatment group. The control group received routine pharmacological and physical therapies, while the treatment group received instruction in mindful breathing and a sleep-inducing exercise in addition to the routine therapies. The Pittsburgh Sleep Quality Index (PSQI), Generalized Anxiety Disorder 7-item (GAD-7) scale, and Insomnia Severity Index (ISI) were utilized to assess sleep-quality improvement in the patient groups before the intervention and at 1 wk, 1 mo, and 3 mo postintervention.

RESULTS

The PSQI, GAD-7, and ISI scores before the intervention and at 1 wk postintervention were not significantly different between the groups. However, compared with the control group, the treatment group exhibited significant improvements in sleep quality, daytime functioning, negative emotions, sleep latency, sleep duration, sleep efficiency, anxiety level, and insomnia severity at 1 and 3 mo postintervention ($P < 0.05$). The results showed that mindful breathing combined

relevant conflicts of interest.

Data sharing statement: Technical appendix, statistical code, and dataset available from the corresponding author at sunxh@sj-hospital.org.

CONSORT 2010 statement: The authors have read the CONSORT 2010 statement, and the manuscript was prepared and revised according to the CONSORT 2010 statement.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Unsolicited manuscript

Specialty type: Medicine, research and experimental

Country/Territory of origin: China

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

Received: April 21, 2021

Peer-review started: April 21, 2021

First decision: June 24, 2021

Revised: July 6, 2021

Accepted: August 23, 2021

Article in press: August 23, 2021

Published online: October 16, 2021

P-Reviewer: Lin CY

S-Editor: Gao CC

L-Editor: Filipodia

P-Editor: Li X

with the sleep-inducing exercise significantly improved the long-term effectiveness of insomnia treatment. At 3 mo, the PSQI scores for the treatment *vs* the control group were as follows: Sleep quality 0.98 ± 0.48 *vs* 1.60 ± 0.63 , sleep latency 1.98 ± 0.53 *vs* 2.80 ± 0.41 , sleep duration 1.53 ± 0.60 *vs* 2.70 ± 0.56 , sleep efficiency 2.35 ± 0.58 *vs* 1.63 ± 0.49 , sleep disturbance 1.68 ± 0.53 *vs* 2.35 ± 0.53 , hypnotic medication 0.53 ± 0.64 *vs* 0.93 ± 0.80 , and daytime dysfunction 1.43 ± 0.50 *vs* 2.48 ± 0.51 (all $P < 0.05$). The GAD-7 scores were 2.75 ± 1.50 *vs* 7.15 ± 2.28 , and the ISI scores were 8.68 ± 2.26 *vs* 3.38 ± 1.76 for the treatment *vs* the control group, respectively (all $P < 0.05$).

CONCLUSION

These simple, cost-effective, and easy-to-implement practices used in clinical or home settings could have profound significance for long-term insomnia treatment and merit wide adoption in clinical practice.

Key Words: Mindful breathing; Sleep-inducing exercise; Insomnia; Treatment effectiveness; Psychotherapy

©The Author(s) 2021. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: The adjunctive therapies of mindful breathing and a sleep-inducing exercise could improve the outcome of patients with insomnia by providing a simple, cost-effective, and easy-to-implement method that can be used both clinically and long-term in a home setting. The findings indicated that compared with the control group, the group that performed mindful breathing and a sleep-inducing exercise in conjunction with routine pharmacological and physical therapies exhibited significant improvements in sleep quality, daytime functioning, negative emotions, sleep latency, sleep duration, sleep efficiency, anxiety level, and insomnia severity at 1 and 3 mo after the intervention ($P < 0.05$).

Citation: Su H, Xiao L, Ren Y, Xie H, Sun XH. Effects of mindful breathing combined with sleep-inducing exercises in patients with insomnia. *World J Clin Cases* 2021; 9(29): 8740-8748

URL: <https://www.wjgnet.com/2307-8960/full/v9/i29/8740.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v9.i29.8740>

INTRODUCTION

Insomnia is the most common sleep disorder[1]. An epidemiological study revealed that 45.4% of survey respondents in China experienced varying degrees of insomnia in the previous month. Chronic insomnia disrupts an individual's life and work and increases the risk of various health issues. It is often accompanied by symptoms such as daytime sleepiness, fatigue, dizziness, and attention problems[2] that reduce patients' work efficiency and alertness, increasing the probability of car, home, or work accidents[3] and often leading to substantial damage. Moreover, both primary and secondary insomnia pose a threat to patients' health. Insomnia cases are increasing annually owing to the accelerating pace of life[4], and as the public becomes more aware of its prevalence and dangers, its rational treatment is being increasingly recognized. In recent years, insomnia treatment approaches have primarily included pharmacological and nonpharmacological (psychological, cognitive-behavioral) therapies[5-7]. Pakpour's group proposed a cognitive behavioral therapy for insomnia (CBT-I) app-based intervention and demonstrated that patients with insomnia showed improved sleep hygiene behaviors, enhanced sleep quality, and less insomnia severity after receiving CBT-I[8,9]. Insomnia often requires long-term intervention, and thus, the financial burden and inconvenience of both approaches discourage patients from complying, leading to chronic insomnia. Mindfulness is a well-researched psychological practice and can be an effective nonpharmacological intervention. For example, the efficacy of mindfulness-based interventions enables the reduction of anxiety and depression[10,11]. More importantly, its stability and effectiveness have also been demonstrated in many studies on insomnia[12]. In this study, we employed a quasi-



experimental design to investigate the effects of mindful breathing combined with a sleep-inducing exercise as adjunctive therapies for patients with insomnia.

MATERIALS AND METHODS

Baseline characteristics

Patients with insomnia admitted to the Sleep Medical Center of Shengjing Hospital of China Medical University between January and August 2020 were included in the study. The patients with insomnia were grouped based on the time of admission: 40 patients admitted between January and April 2020 were assigned to the control group, which was composed of 13 males and 27 females with a mean age of 51.3 ± 10.2 years, and 40 patients admitted between May and August 2020 were assigned to the treatment group, which consisted of 15 males and 25 females, with a mean age of 52.4 ± 11.5 years. The groups were comparable in baseline characteristics with no significant differences, as shown in [Table 1](#).

Inclusion criteria

All the included patients met the criteria stipulated in the guidelines for diagnosing and treating insomnia disorders in China[13]. All patients signed an informed consent form and were willing to be followed-up for 3 mo after discharge.

Exclusion criteria

Exclusion criteria were patients with (1) communication disorders who could not receive both interventions; (2) severe cardiovascular and cerebrovascular diseases and other serious comorbidities that rendered them unable to perform self-care; (3) unresolved psychological conflicts due to major life events; (4) diseases of the head, neck, limbs, or joints; and (5) the lack of ability to perform the required mindful breathing and sleep-inducing exercise.

Specific implementation methods

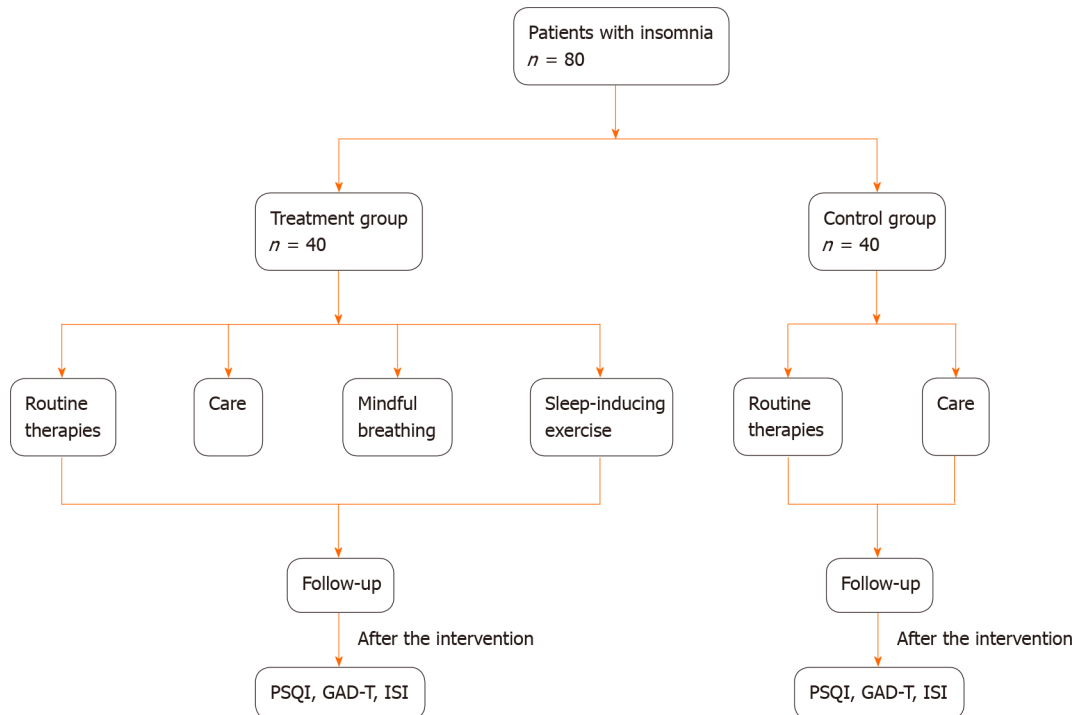
The flowchart of the study design is shown in [Figure 1](#). The control group received routine therapies and care, while the treatment group performed mindful breathing and a sleep-inducing exercise in addition to the routine therapies and care. Mindful breathing is a psychological intervention based on the principle of maintaining a constant attitude of nonjudgment, effortlessness, calmness, self-care, self-trust, and acceptance while observing the breath[14]. The guided mindful breathing practice was performed daily, overseen by a nurse who played an audio recording of the instructions in the treatment-group patient's ward for 30 min prior to bedtime. During the intervention, the patients adopted a comfortable position, either sitting or lying down. Throughout the audio guidance, the patients were prompted to become aware of their breathing. They were instructed to keep their minds free from distractions and focus on their breathing sounds, rhythm, movements, and patterns. They concentrated on sensing all aspects of their breathing, focusing their attention on the entire breathing process, including the inward and outward motion of the abdomen caused by breathing. The sleep-inducing exercise was developed by Professor Sun Wei of the Peking University Sixth Hospital, Beijing, China, based on Daoist health-preserving foundation exercises (Zhu Ji Gong) with modifications. It involves twisting the trunk (the region of the body below the head and above the waist) to stimulate the conception and governing vessels. During the exercise, the patient's mind is focused on rotating his or her trunk, thus reducing distracting thoughts and allowing the mind to attain "a state of inner stillness," leading to relaxation and concentration.

The exercise was implemented and followed-up by a team comprising a psychotherapist and six polysomnographic nurses. The psychotherapist was responsible for the formulation, final decision-making aspects of the study, and the patients' psychological counseling before and after the intervention. This procedure was followed to ensure that the patients fully understood the purpose and significance of the interventions, thereby increasing their commitment to cooperate and perform them earnestly. The six professionally trained nurses were responsible for conducting the patients' daily practice. One of the nurses was responsible for following up with patients after they were discharged. During the hospitalization period, the patients were guided daily by the nurses to perform the sleep-inducing exercise once in the afternoon and mindful breathing for 30 min before going to bed. A "WeChat" group was set up to follow-up with the patients after their discharge. They were reminded

Table 1 Comparison of baseline characteristics of insomnia patients in the treatment group and control group

Characteristic	Treatment, <i>n</i> = 40	Control, <i>n</i> = 40
Age in yr, mean \pm SD	52.4 \pm 11.5	51.3 \pm 10.2
Male sex, <i>n</i> /total <i>n</i> (%)	13/40 (32.5)	15/40 (37.5)
Married, <i>n</i> /total <i>n</i> (%)	37/40 (92.5)	38/40 (95)
University graduate, <i>n</i> /total <i>n</i> (%)	32/40 (80)	34/40 (85)

SD: Standard deviation.

**Figure 1 Flowchart of the study design.** PSQI: Pittsburgh Sleep Quality Index; GAD-7: Generalized Anxiety Disorder 7-item scale; ISI: Insomnia Severity Index.

daily to practice the two interventions at the specified time as instructed and reported from their homes daily *via* "WeChat." The follow-up period ended when the patients had practiced for 3 mo. Both groups had complete follow-up information.

Assessment

Follow-up interviews were performed *via* telephone at 1 wk, 1 mo, and 3 mo after the intervention, and the information collected was used to calculate the Pittsburgh Sleep Quality Index (PSQI), Generalized Anxiety Disorder 7-item (GAD-7) scale, and Insomnia Severity Index (ISI) values. The overall sleep quality of the patient groups was subsequently assessed based on the data collected. The PSQI consists of 18 items across seven components, and each component is given a score of 0-3. The PSQI global score is calculated from the sum of all components' scores and ranges from 0 to 21, where a higher score indicates poorer sleep quality, and it assesses components such as sleep quality, sleep latency, sleep duration, sleep efficiency, and daytime dysfunction. The GAD-7 scale classifies anxiety into four categories – none, mild, moderate, and severe – based on the total score; higher total scores indicate increasingly severe anxiety. The ISI comprises seven questions, and the results are classified as "no clinically significant insomnia," "subthreshold insomnia," "clinical insomnia (moderate severity)," and "clinical insomnia (severe)." A higher total score indicates more severe insomnia.

Statistical analyses

The data analysis was performed using SPSS 17.0 statistical software (Chicago, IL, United States). The numeric data were expressed as $\bar{x} \pm S$, and *t*-tests were performed. Differences with $P < 0.05$ were considered significant.

RESULTS

Patient group PSQI score comparison before and after intervention

Both patient groups were similarly treated once with hypnotic medication within 1 wk of admission. The PSQI scores before the intervention and at 1 wk after the intervention were not significantly different between the two groups. After 1 mo of intervention, the PSQI score for the hypnotic medication was not significantly different between the groups; however, the other components exhibited significant differences ($P < 0.05$). After 3 mo of intervention, the PSQI scores for sleep quality, latency, duration, and efficiency to daytime dysfunction were significantly different between the groups ($P < 0.05$) (Tables 2-5).

Patient group GAD-7 score comparison

The GAD-7 scores before the intervention and at 1 wk after the intervention were not significantly different between the groups. However, at 1 and 3 mo after the intervention, the differences were significant ($P < 0.05$) (Table 6).

Patient group ISI score comparison

The ISI scores before and 1 wk after the intervention were not significantly different between the groups. However, at 1 and 3 mo after the intervention, the differences were significant ($P < 0.05$) (Table 7).

DISCUSSION

Mindful breathing and sleep-inducing exercises are economical, long-term adjunctive therapies that patients can practice after leaving the hospital. The current insomnia treatments include psychological, pharmacological, and physical therapies as well as treatment with traditional Chinese medicine. The psychological therapy procedures primarily include sleep hygiene education and cognitive-behavioral therapy. Although cognitive-behavioral therapy is considered the preferred treatment option in the field [15], it requires equipment and technical support, and individuals who can benefit from online education are limited. The cost of the therapy is also an obstacle for certain groups [16,17]. Clinical observations have proven [18,19] the short-term efficacy of pharmacological treatments for insomnia; however, their long-term use can be associated with potential risks, such as adverse drug reactions and addiction. Physical therapy includes transcranial magnetic stimulation, auditory stimulation, phototherapy, and biofeedback therapy; however, data from large-sample studies to support their efficacies are lacking. In addition, these procedures require patients to be in the hospital; thus, the inconvenience and financial requirements are limitations for patients considering therapy [20]. The use of traditional Chinese medicine to treat insomnia has a long-standing history; however, its current use is limited by the individualized approach of modern medicine, and its effectiveness cannot be demonstrated by using modern evidence-based methods. Therefore, the development of adjunctive therapy and care approaches is needed in clinical practice to overcome obstacles to the nonpharmacological treatment of insomnia [21]. The emergence of mindful breathing and sleep-inducing exercises could address this need.

The principles of mindful breathing and sleep-inducing exercises focus on enhancing body awareness and inducing changes in emotions and self-concept. The principle of mindful breathing involves attention to breathing, body regulation, body awareness, and emotion regulation and leads to self-concept changes. By being aware of the present moment, one's perception of sleep can be changed, thereby allowing the search for solutions with a peaceful mind [22]. Hofmann and Gómez [23] demonstrated the positive outcomes of mindful breathing on the anxiety and depression experienced by patients with insomnia. The present study incorporated a sleep-inducing exercise to achieve better sleep quality, sleep efficiency, and other long-term clinical effects. Sleep-inducing exercises are simple to perform, effective, economical, and practical; they can clear the meridians, modulate body functions, calm the mind, and improve concen-

Table 2 Patient group Pittsburgh Sleep Quality Index score comparison before intervention

Group	Sleep quality	Sleep latency	Sleep duration	Sleep efficiency	Sleep disturbance	Hypnotic medication	Daytime dysfunction
Treatment group, <i>n</i> = 40	2.83 ± 0.39	2.93 ± 0.42	2.93 ± 0.27	2.80 ± 0.41	2.70 ± 0.46	1.08 ± 0.83	2.53 ± 0.64
Control group, <i>n</i> = 40	2.70 ± 0.46	2.90 ± 0.30	2.93 ± 0.27	2.75 ± 0.44	2.73 ± 0.45	1.23 ± 1.00	2.63 ± 0.54
<i>t</i>	-1.311	-0.391	0.000	-0.530	0.244	0.731	0.755
<i>P</i> value	0.194	0.697	1.000	0.598	0.808	0.467	0.452

Table 3 Patient group Pittsburgh Sleep Quality Index score comparison 1 wk after intervention

Group	Sleep quality	Sleep latency	Sleep duration	Sleep efficiency	Sleep disturbance	Daytime dysfunction
Treatment group, <i>n</i> = 40	0.98 ± 0.36	2.55 ± 0.50	1.60 ± 0.63	1.75 ± 0.54	1.70 ± 0.56	1.63 ± 0.54
Control group, <i>n</i> = 40	1.05 ± 0.50	2.68 ± 0.47	1.60 ± 0.59	1.83 ± 0.45	1.70 ± 0.52	1.70 ± 0.46
<i>t</i>	0.769	0.391	0.000	0.675	0.000	0.666
<i>P</i> value	0.445	0.697	1.000	0.502	1.000	0.507

Table 4 Patient group Pittsburgh Sleep Quality Index score comparison 1 mo after intervention

Group	Sleep quality	Sleep latency	Sleep duration	Sleep efficiency	Sleep disturbance	Hypnotic medication use	Daytime dysfunction
Treatment group, <i>n</i> = 40	0.95 ± 0.32	2.20 ± 0.41	1.48 ± 0.64	2.25 ± 0.59	1.50 ± 0.56	2.70 ± 0.79	1.55 ± 0.60
Control group, <i>n</i> = 40	1.28 ± 0.51	2.73 ± 0.45	2.40 ± 0.63	1.68 ± 0.47	2.39 ± 0.49	2.60 ± 0.84	2.38 ± 0.54
<i>t</i>	3.446	5.469	6.502	-4.812	7.475	-0.548	6.481
<i>P</i> value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 5 Patient group Pittsburgh Sleep Quality Index score comparison 3 mo after intervention

Group	Sleep quality	Sleep latency	Sleep duration	Sleep efficiency	Sleep disturbance	Hypnotic medication use	Daytime dysfunction
Treatment group, <i>n</i> = 40	0.98 ± 0.48	1.98 ± 0.53	1.53 ± 0.60	2.35 ± 0.58	1.68 ± 0.53	0.53 ± 0.64	1.43 ± 0.50
Control group, <i>n</i> = 40	1.60 ± 0.63	2.80 ± 0.41	2.70 ± 0.56	1.63 ± 0.49	2.35 ± 0.53	0.93 ± 0.80	2.48 ± 0.51
<i>t</i>	4.980	7.817	9.037	-6.040	5.700	2.475	9.332
<i>P</i> value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

tration. A considerable amount of exercise can be performed by twisting various parts of the body, promoting blood circulation, and simultaneously fulfilling the daily activity requirement, thereby enhancing physical fitness[24]. Patients with insomnia often experience negative emotions, such as depression and anxiety, which can be relieved by an appropriate amount of daytime exercise.

CONCLUSION

In this study, we found that the combination of mindful breathing and a sleep-inducing exercise are useful as adjunctive therapies in the long-term treatment of patients with insomnia. The PSQI, GAD-7, and ISI are internationally recognized

Table 6 Patient group Generalized Anxiety Disorder 7-item scale total score comparison before and after interventions

Group	Before intervention	After intervention		
		1 wk	1 mo	3 mo
Treatment group, <i>n</i> = 40	12.20 ± 4.07	5.60 ± 1.87	3.38 ± 1.68	2.75 ± 1.50
Control group, <i>n</i> = 40	11.18 ± 1.97	4.98 ± 1.75	6.05 ± 1.80	7.15 ± 2.28
<i>t</i>	-1.431	-1.547	6.888	10.195
<i>P</i> value	0.156	0.126	< 0.001	< 0.001

Table 7 Patient group Insomnia Severity Index score comparison before and after interventions

Group	Before intervention	After intervention		
		1 wk	1 mo	3 mo
Treatment group, <i>n</i> = 40	22.13 ± 3.30	10.63 ± 1.96	5.75 ± 1.28	8.68 ± 2.26
Control group, <i>n</i> = 40	21.38 ± 2.88	11.95 ± 1.05	7.40 ± 2.45	3.38 ± 1.76
<i>t</i>	-1.083	-0.974	3.781	-11.699
<i>P</i> value	0.282	0.333	< 0.001	< 0.001

instruments for assessing sleep quality, anxiety status, and insomnia severity, respectively[25]. Our results showed that 1 wk of intervention with routine pharmacological and physical intervention therapies administered to patients with insomnia during the hospitalization period did not significantly affect the treatment group. Thus, the effectiveness of the two practices was not demonstrated within that short time frame. However, compared with those in the control group, patients in the treatment group exhibited significant improvements in sleep quality, sleep latency, sleep efficiency, sleep duration, daytime functioning, anxiety level, and insomnia severity at 1 and 3 mo after the intervention. The enhancement of sleep quality can be attributed to the mindful breathing and sleep-inducing exercise during home practice. Moreover, hypnotic medication efficacy improved after 3 mo of intervention. The results indicated that mindful breathing combined with the sleep-inducing exercise significantly improved the long-term effectiveness of insomnia treatment. Patients can continue to perform both practices as adjunctive therapies autonomously after being discharged from the hospital. These practices improve their ability to focus on themselves by acquiring and mastering a self-care option to treat their insomnia, in addition to reducing the use of medical resources. Thus, these practices merit long-term commitment and wide adoption in clinical settings.

ARTICLE HIGHLIGHTS

Research background

Insomnia is the most common sleep disorder. It disrupts the patient's life and work, increases the risk of various health issues, and often requires long-term intervention. The financial burden and inconvenience discourage patients from complying with the treatments, leading to chronic insomnia.

Research motivation

Mindfulness is a well-researched psychological practice and can be an effective nonpharmacological intervention, and its stability and effectiveness have been demonstrated in many studies about the insomnia. Herein, we employed a use a quasi-experimental design to investigate the effects of mindful breathing combined with a sleep-inducing exercise as adjunctive therapies for patients with insomnia.

Research objectives

To investigate the effects of mindful breathing combined with sleep-inducing exercises in patients with insomnia.

Research methods

In this work, the control group received routine therapies and care, while the treatment group was intervened with mindful breathing and a sleep-inducing exercise in addition to the routine therapies and care. The guided mindful breathing practice was performed daily, overseen by a nurse who played an audio recording of the guiding instructions in the treatment-group patient's ward for 30 min prior to bedtime. Follow-up interviews were performed *via* telephone at 1 wk, 1 mo, and 3 mo after the intervention, and the information collected was used to complete the Pittsburgh Sleep Quality Index, Generalized Anxiety Disorder 7-item scale, and Insomnia Severity Index.

Research results

Our results showed that 1 wk of intervention with the routine pharmacological and physical intervention therapies administered to the patients with insomnia during the hospitalization period did not significantly affect the treatment group. Thus, the effectiveness of the two practices was not demonstrated within that short time-frame. However, compared with the control group, patients in the treatment group exhibited significant improvements in sleep quality, sleep latency, sleep efficiency, sleep duration, daytime functioning, anxiety level, and insomnia severity at 1 and 3 mo of the intervention.

Research conclusions

We found that the combination of mindful breathing and a sleep-inducing exercise are useful as adjunctive therapies in the long-term treatment of patients with insomnia.

Research perspectives

The future research aims at how to enhance the effect of mindful breathing and a sleep-inducing exercise on the treatment of insomnia.

REFERENCES

- 1 Merrigan JM, Buysse DJ, Bird JC, Livingston EH. JAMA patient page. Insomnia. *JAMA* 2013; **309**: 733 [PMID: 23423421 DOI: 10.1001/jama.2013.524]
- 2 Chung KF, Yeung WF, Ho FY, Yung KP, Yu YM, Kwok CW. Cross-cultural and comparative epidemiology of insomnia: the Diagnostic and statistical manual (DSM), International classification of diseases (ICD) and International classification of sleep disorders (ICSD). *Sleep Med* 2015; **16**: 477-482 [PMID: 25761665 DOI: 10.1016/j.sleep.2014.10.018]
- 3 Léger D, Bayon V, Ohayon MM, Philip P, Ement P, Metlaine A, Chennaoui M, Faraut B. Insomnia and accidents: cross-sectional study (EQUINOX) on sleep-related home, work and car accidents in 5293 subjects with insomnia from 10 countries. *J Sleep Res* 2014; **23**: 143-152 [PMID: 24237855 DOI: 10.1111/jsr.12104]
- 4 Jha MK, Minhajuddin A, South C, Rush AJ, Trivedi MH. Worsening Anxiety, Irritability, Insomnia, or Panic Predicts Poorer Antidepressant Treatment Outcomes: Clinical Utility and Validation of the Concise Associated Symptom Tracking (CAST) Scale. *Int J Neuropsychopharmacol* 2018; **21**: 325-332 [PMID: 29182724 DOI: 10.1093/ijnp/pyx097]
- 5 Sateia MJ, Buysse DJ, Krystal AD, Neubauer DN, Heald JL. Clinical Practice Guideline for the Pharmacologic Treatment of Chronic Insomnia in Adults: An American Academy of Sleep Medicine Clinical Practice Guideline. *J Clin Sleep Med* 2017; **13**: 307-349 [PMID: 27998379 DOI: 10.5664/jcsm.6470]
- 6 Arnedt JT, Cuddihy L, Swanson LM, Pickett S, Aikens J, Chervin RD. Randomized controlled trial of telephone-delivered cognitive behavioral therapy for chronic insomnia. *Sleep* 2013; **36**: 353-362 [PMID: 23450712 DOI: 10.5665/sleep.2448]
- 7 Pillai V, Roth T, Roehrs T, Moss K, Peterson EL, Drake CL. Effectiveness of Benzodiazepine Receptor Agonists in the Treatment of Insomnia: An Examination of Response and Remission Rates. *Sleep* 2017; **40** [PMID: 28364510 DOI: 10.1093/sleep/zsw044]
- 8 Rajabi Majd N, Broström A, Ulander M, Lin CY, Griffiths MD, Imani V, Ahorsu DK, Ohayon MM, Pakpour AH. Efficacy of a Theory-Based Cognitive Behavioral Technique App-Based Intervention for Patients With Insomnia: Randomized Controlled Trial. *J Med Internet Res* 2020; **22**: e15841 [PMID: 32234700 DOI: 10.2196/15841]
- 9 Lin CY, Strong C, Scott AJ, Broström A, Pakpour AH, Webb TL. A cluster randomized controlled trial of a theory-based sleep hygiene intervention for adolescents. *Sleep* 2018; **41** [PMID: 30423178 DOI: 10.1093/sleep/zsy170]
- 10 Blanck P, Perleth S, Heidenreich T, Kröger P, Ditzgen B, Bents H, Mander J. Effects of mindfulness exercises as stand-alone intervention on symptoms of anxiety and depression: Systematic review and meta-analysis. *Behav Res Ther* 2018; **102**: 25-35 [PMID: 29291584 DOI: 10.1016/j.brat.2017.12.002]

- 11 **Bamber MD**, Morpeth E. Effects of Mindfulness Meditation on College Student Anxiety: a Meta-Analysis. *Mindfulness* 2019; **10**: 203-214 [DOI: [10.1007/s12671-018-0965-5](https://doi.org/10.1007/s12671-018-0965-5)]
- 12 **Kim HG**. Effects and mechanisms of a mindfulness-based intervention on insomnia. *Yeungnam Univ J Med* 2021 [PMID: [33440465](https://pubmed.ncbi.nlm.nih.gov/33440465/) DOI: [10.12701/yujm.2020.00850](https://doi.org/10.12701/yujm.2020.00850)]
- 13 **Sleep Disorders Group of Neurology Branch of Chinese Medical Association**. Guidelines for Diagnosis and Treatment of Insomnia in Chinese Adults. *Zhonghua Shengjingke Zazhi* 2012; **7**
- 14 **McConville J**, McAleer R, Hahne A. Mindfulness Training for Health Profession Students-The Effect of Mindfulness Training on Psychological Well-Being, Learning and Clinical Performance of Health Professional Students: A Systematic Review of Randomized and Non-randomized Controlled Trials. *Explore (NY)* 2017; **13**: 26-45 [PMID: [27889445](https://pubmed.ncbi.nlm.nih.gov/27889445/) DOI: [10.1016/j.explore.2016.10.002](https://doi.org/10.1016/j.explore.2016.10.002)]
- 15 **Kaczurkin AN**, Foa EB. Cognitive-behavioral therapy for anxiety disorders: an update on the empirical evidence. *Dialogues Clin Neurosci* 2015; **17**: 337-346 [PMID: [26487814](https://pubmed.ncbi.nlm.nih.gov/26487814/) DOI: [10.31887/DCNS.2015.17.3/akaczurkin](https://doi.org/10.31887/DCNS.2015.17.3/akaczurkin)]
- 16 **Martires J**, Zeidler M. The value of mindfulness meditation in the treatment of insomnia. *Curr Opin Pulm Med* 2015; **21**: 547-552 [PMID: [26390335](https://pubmed.ncbi.nlm.nih.gov/26390335/) DOI: [10.1097/MCP.0000000000000207](https://doi.org/10.1097/MCP.0000000000000207)]
- 17 **Fisher A**, Bellon M, Lawn S, Lennon S, Sohlberg M. Family-directed approach to brain injury (FAB) model: a preliminary framework to guide family-directed intervention for individuals with brain injury. *Disabil Rehabil* 2019; **41**: 854-860 [PMID: [29171308](https://pubmed.ncbi.nlm.nih.gov/29171308/) DOI: [10.1080/09638288.2017.1407966](https://doi.org/10.1080/09638288.2017.1407966)]
- 18 **Wu R**, Bao J, Zhang C, Deng J, Long C. Comparison of sleep condition and sleep-related psychological activity after cognitive-behavior and pharmacological therapy for chronic insomnia. *Psychother Psychosom* 2006; **75**: 220-228 [PMID: [16785771](https://pubmed.ncbi.nlm.nih.gov/16785771/) DOI: [10.1159/000092892](https://doi.org/10.1159/000092892)]
- 19 **Kay-Stacey M**, Attarian H. Advances in the management of chronic insomnia. *BMJ* 2016; **354**: i2123 [PMID: [27383400](https://pubmed.ncbi.nlm.nih.gov/27383400/) DOI: [10.1136/bmj.i2123](https://doi.org/10.1136/bmj.i2123)]
- 20 **Han F**, Tang XD, Zhang B. Guidelines for the diagnosis and treatment of insomnia in China. *Natl Med J China* 2017; **97**: 1844-1856
- 21 **Jin R**, Wang X, Lv Y, Xu G, Yang C, Guo Y, Li X. The efficacy and safety of auricular point combined with moxibustion for insomnia: A protocol for systematic review and meta-analysis. *Medicine (Baltimore)* 2020; **99**: e22107 [PMID: [33031258](https://pubmed.ncbi.nlm.nih.gov/33031258/) DOI: [10.1097/MD.00000000000022107](https://doi.org/10.1097/MD.00000000000022107)]
- 22 **Fang Y**, Kang X, Feng X, Zhao D, Song D, Li P. Conditional effects of mindfulness on sleep quality among clinical nurses: the moderating roles of extraversion and neuroticism. *Psychol Health Med* 2019; **24**: 481-492 [PMID: [29969284](https://pubmed.ncbi.nlm.nih.gov/29969284/) DOI: [10.1080/13548506.2018.1492731](https://doi.org/10.1080/13548506.2018.1492731)]
- 23 **Hofmann SG**, Gómez AF. Mindfulness-Based Interventions for Anxiety and Depression. *Psychiatr Clin North Am* 2017; **40**: 739-749 [PMID: [29080597](https://pubmed.ncbi.nlm.nih.gov/29080597/) DOI: [10.1016/j.psc.2017.08.008](https://doi.org/10.1016/j.psc.2017.08.008)]
- 24 **Liu F**, Shen C, Yao L, Li Z. Acupoint Massage for Managing Cognitive Alterations in Older Adults: A Systematic Review and Meta-Analysis. *J Altern Complement Med* 2018; **24**: 532-540 [PMID: [29584457](https://pubmed.ncbi.nlm.nih.gov/29584457/) DOI: [10.1089/acm.2017.0142](https://doi.org/10.1089/acm.2017.0142)]
- 25 **Scarpa M**, Pinto E, Saadeh LM, Parotto M, Da Roit A, Pizzolato E, Alfieri R, Cagol M, Saraceni E, Baratto F, Castoro C. Sleep disturbances and quality of life in postoperative management after esophagectomy for esophageal cancer. *World J Surg Oncol* 2014; **12**: 156 [PMID: [24886219](https://pubmed.ncbi.nlm.nih.gov/24886219/) DOI: [10.1186/1477-7819-12-156](https://doi.org/10.1186/1477-7819-12-156)]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

