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Effects of a Short-term Mindfulness-Based Intervention on Comfort of Stroke Survivors Undergoing Inpatient Rehabilitation

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Abstract

Purpose: The aim of the study was to evaluate the effectiveness of a modified short-term mindfulness-based intervention on improving the mindfulness, comfort, and ambulation ability of stroke survivors undergoing inpatient rehabilitation in Wuhan, China.

Design: A two-group, nonrandomized, nonconcurrent design was used.

Method: Participants undergoing inpatient rehabilitation were nonrandomly divided into control group ($n = 25$) and intervention group ($n = 25$) to avoid possible ethical discrimination as well as interaction among participants. The control group received routine care; the intervention group received a 2-week mindfulness-based intervention, which included weekly 1.5-hour group practice, individual daily practice, and routine care. Data were collected using questionnaires and assessments of ambulation before and after 2 weeks of observation.

Findings: Improvement on the Mindful Attention Awareness Scale score, the overall score of the Shortened General Comfort Questionnaire, and the scores of the physical, psychospiritual, and sociocultural subscales in the intervention group was greater than those in the control group ($p < .05$). No significant difference ($p > .05$) was observed between the two groups when comparing scores of the environmental subscale of Shortened General Comfort Questionnaire, Berg Balance Scale, 10-Meter Walk Test, and Functional Ambulation Classification scale.

Conclusions and Clinical Relevance: A 2-week mindfulness-based intervention can significantly improve stroke survivors' mindfulness and comfort but does not significantly affect ambulation ability.

Keywords: Ambulation; comfort; mindfulness; rehabilitation nursing; stroke.

Introduction

Stroke is one of the most common causes of severe impairment and permanent disability of survivors globally, especially in developing countries (Feigin et al., 2014). According to a report from the 2013 Global Burden of Disease Stroke Panel Experts Group, 11 million adults aged 20–64 years experienced a stroke and 1.5 million died from stroke in 2013, which led to a disability-adjusted life years of over 51 million (Krishnamurthi et al., 2015). In China, stroke is the third leading cause of death and a major cause of adult disability (Liu, Wang, Wong, & Wang, 2011). A recent survey conducted in Beijing showed that the rates of total, mild, and severe disability among stroke survivors were 21.76%, 78.11%, and 21.89%, respectively (Li, Liu, Fang, Mu, & Zhang, 2015). Stroke survivors have various dimensions of disability; most physical disabilities are related to ambulation impairment due to brain and central nerve damage (Balasubramanian, Clark, & Fox, 2014). Impaired ambulation worsens stroke survivors' health and quality of life by restricting activities and leads to stroke recurrence (Outermans, Pool, van de Port, Bakers, & Wittink, 2016). Therefore, restoration of ambulatory function should be a significant goal of poststroke rehabilitation (Hornnes, Larsen, & Boysen, 2010).

Inpatient rehabilitation can reduce long-term disabilities, but studies show that negative emotions and inappropriate use of coping strategies are common among stroke survivors and adversely affect rehabilitation outcomes (Karamchandani et al., 2015; Luker, Lynch, Bernhardsson, Bennett, & Bernhardt, 2015; Tang, Lau,

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Mok, Ungvari, & Wong, 2015). Moreover, unfavorable hospital environments with less stimulation, motivation, and empowerment may also hinder stroke rehabilitation (Holmqvist & von Koch, 2001). When health professionals neglect comfort factors such as providing emotional support, effective communication, and reducing ambient noise, this jeopardizes stroke survivors' motivation to comply with rehabilitation training; this may lead to a poor therapeutic outcome (Maclean, Pound, Wolfe, & Rudd, 2002). Given the significance of motivation in physical rehabilitation, it is imperative to provide holistic comfort care for stroke survivors during inpatient rehabilitation.

Nurses regard holistic care as essential nursing practice—the connection of body, mind, and spirit in promoting health recovery; this is known as "mindfulness." Mindfulness is a mental state achieved by focusing on awareness in the present moment and acceptance of feelings, thoughts, and body sensations (Brown & Ryan, 2003). On the basis of the Oriental Zen philosophy, John Kabat-Zinn defined mindfulness as "on purpose," "in the moment," and "being nonjudgmental" (Kabat-Zinn, 2003). Under this philosophy, several mindfulness-based interventions, such as Mindfulness-Based Stress Reduction, Mindfulness-Based Cognitive Therapy, Dialectic Behavior Therapy, and Acceptance and Commitment Therapy, were developed to help people confront their illness by establishing an attitude of nonjudgmental awareness and an acceptance of the present moment (Shonin, Van Gordon, & Griffiths, 2013). Studies show that mindfulness-based interventions over a period of 6–8 weeks relieve physical and psychological symptoms of stroke survivors with no adverse effects (Abbott et al., 2014; Lawrence, Booth, Mercer, & Crawford, 2013; Lazaridou, Philbrook, & Tzika, 2013).

Mindfulness-based interventions are an effective nonpharmacologic treatment for stroke survivors to gain psychological and physical improvements (Lazaridou et al., 2013). Nurses can obtain training via either formal (certification) or informal (without certification) programs to integrate mindfulness-based interventions into routine care of stroke survivors to meet their holistic needs (Williams, Simmons, & Tanabe, 2015). The integration of mindfulness-based interventions into inpatient rehabilitation programs can be beneficial in promoting rehabilitation outcomes for stroke survivors. It has been suggested that adapting suitable mindfulness-based interventions for stroke survivors requires further research (Abbott et al., 2014). Given the time limitations of inpatient rehabilitation care in China, the implementation of a tailored short-term mindfulness-based intervention for stroke survivors would be helpful. The purpose of this study was to evaluate the effectiveness of a modified short-term mindfulness-based intervention on stroke survivors' mindfulness, comfort, and ambulation ability.

Kolcaba's Theory of Comfort

This study was conducted on the basis of Kolcaba's Theory of Comfort (Kolcaba, 2010). The key concepts of this theory comprise healthcare needs of patients/family, nursing interventions, intervening variables, patient comfort, health-seeking behaviors, and institutional integrity (Kolcaba, 2001). In Kolcaba's (1994) concept analysis, three forms of comfort (relief, ease, and transcendence) within four contexts (physical, psychospiritual, sociocultural, and environmental) of human experiences have been generated as the taxonomic structure of comfort. Propositions of the theory vary from causal to correlative: (1) nurses identify patients' unmet comfort needs; (2) nurses design interventions to satisfy unmet needs; (3) intervening variables are weighed when designing interventions and prognosing outcomes; (4) once comfort is improved, patients are encouraged to engage in health-seeking behaviors; (5) when such encouragement is achieved, nurses and patients will be more content with health care; and (6) when patients are content with health care and outcomes in a certain institution, it will be recognized by its capability (Kolcaba, 2001). The use of the Comfort Theory is appropriate for application in stroke survivors undergoing inpatient rehabilitation.

Luker et al.'s study in 2015 suggested that most stroke survivors have negative feelings during inpatient rehabilitation. Negative feelings reduced their comfort levels and eventually degraded their rehabilitation outcomes (Luker et al., 2015). Chinese nursing experts reported that holistic comfort care can benefit stroke survivors both physically and psychospiritually during hospitalization (Wang, Dong, Sun, & Zheng, 2006). Nurses should provide holistic comfort care for stroke survivors to facilitate rehabilitation outcome. During the delivery of the mindfulness-based intervention, nurses assessed patients using the taxonomy of comfort to identify needs related to pain relief, stress, anxiety, or improved ambulation. This mindfulness-based intervention aimed to promote comfort and improve ambulation ability as the external health-seeking behavior.

Materials and Method

Design, Sample, and Setting

A two-group, nonrandomized, nonconcurrent designed was used to avoid ethical discrimination. If control group participants had been hospitalized at the same time as the intervention group, they could have learned about the intervention through communication with participants in

the intervention group. They might have learned about the mindfulness practice and expected that it be integrated in their care. Thus, stroke survivors in the control group were invited first, followed by those in the intervention group. This resulted in the control and intervention group participants not being hospitalized during the same period.

In a previous mindfulness-based intervention study of Chinese stroke survivors, an effect size of 1.51 was one of the primary endpoints in using the Mindful Attention Awareness Scale (MAAS; Li, Zhao, Chen, & Ma, 2015); therefore, a large effect size of ≥0.80 was appropriate in the present study. According to a power analysis using G*Power 3, a total sample size of 44 participants with 22 in the control group and 22 in the intervention group was adequate to achieve 80% power with an alpha of .05 and an effect size of 0.88. Assuming a possible attrition rate of 15%, the total sample size was increased to 50 with 25 in each group. Inclusion criteria were (1) diagnosis of stroke and in stable disease condition; (2) age 18 years or older; (3) able to communicate and collaborate with researcher; (4) ambulation impairment, but could safely perform physical rehabilitation assessment; and (5) primary rehabilitation treatment was physical therapy. Stroke survivors were excluded if they had existing complications, accompanied by other neuromuscular diseases; had substance abuse behavior; received transcranial magnetic stimulation therapy; or were undergoing treatment with antipsychotic medications. Convenience sampling was used to recruit 50 participants meeting inclusion criteria. Recruitment occurred from September 2015 to February 2016, and participants were nonrandomly divided into two groups.

The study protocol was audited and approved by the ethics committee of Wuhan University HOPE School of Nursing and the Nursing Department of the hospital. Patients who agreed to participate in the study were informed about study details and signed written informed consent. Patients were told they could withdraw from the study at any time without prejudice and were informed about protection of their human rights and right to privacy.

Measurements

Demographic Questionnaire. Information was collected about participants' age, gender, nationality, education level, income, marital status, nonprofessional caregiver, medication history, and hospital departments where admission occurred (Rehabilitation Medicine and Neurology). These data examined the homogeneity of stroke survivors between the two groups.

Chinese Version of MAAS. This was used to assess participants' mindful attention toward the present moment. MAAS is a Likert 6 single dimension self-rating scale designed by Brown and Ryan (2003) consisting of 15 items. The Chinese version of this scale was translated and tested by Deng et al. (2012), with a relatively high Cronbach's α of .85. The original authors and the authors of the Chinese translation permitted researchers of the current study to use the translation of MAAS. In the present study, Cronbach's α of the Chinese version was .871 at baseline and .900 at posttest.

Chinese Version of Shortened General Comfort Questionnaire. This was developed and used by Kolcaba in research on hand massage and comfort of nursing home residents and reported Cronbach's α above .80 (Kolcaba, Schirm, & Steiner, 2006). This Likert 6 self-rating scale has 28 items; higher scores indicate better comfort. The Shortened General Comfort Questionnaire (SGCQ) was translated and used with permission of the author. The Chinese version was translated and back-translated by qualified personnel and showed reliability with Cronbach's α of .913 in the pilot study. In the present study, Cronbach's α of the Chinese version was .874 at baseline and .892 at posttest.

Ambulation Ability. Berg Balance Scale (BBS) was used to assess participants' balance function by asking him/her to perform 14 assignments, such as ability to sit and stand without support, etc.; each assignment performed was rated from 0 to 4, and a higher score indicates better ambulation ability (Berg, Wood-Dauphinee, & Williams, 1995). A recent meta-analysis shows that BBS is a valid screening tool to predict balance function with test accuracy, sensitivity, and specificity values of .84, .72, and .73, respectively (Park & Lee, 2016).

The 10-Meter Walk Test (10MWT) was used to assess gait speed of participants. A 10-meter distance was set to allow participants to walk without physical support from others. Within the 10 meters, the first and last 2 meters were designed for acceleration and deceleration and should be excluded; only time required for walking in the mid-6-meters was recorded with an average of three repeated tests (Nagano, Hori, & Muramatsu, 2015). A comfortable speed test was utilized in the present study.

Functional Ambulation Classification Scale (FAC) was used to categorize participants' ambulation level. FAC includes six levels from 0 = "unable to ambulate, ambulates only in parallel bars, or requires supervision or physical assistance from more than 1 person" to 5 = "independent ambulation on level and non-level surfaces" (Holden, Gill, & Magliozzi, 1986; Holden, Gill, Magliozzi, Nathan, & Piehl-Baker, 1984). Participants ambulating with complete use of a wheelchair are scored as 0, with two crutches as 1, and with other assistive devices like knee-ankle-foot orthosis, ankle-foot orthosis, single crutch, or cane as 2 (Holden et al.,

1984, 1986). If participants performed better, they received higher scores.

Procedure

In the first stage of the study, the researcher (M. W.) recruited 25 stroke survivors as control group participants from the Department of Rehabilitation Medicine (nine participants) and the Department of Neurology (16 participants). At the end of recruitment, the researcher administered the demographic questionnaire, MAAS, and SGCQ. An appointed physical therapist who was blinded to the study design and participant allocation administered the BBS, 10MWT, and FAC to the control group and reported data to the researcher. After baseline assessments were completed, the control group received routine treatment. Because length of hospitalization was limited to 2 weeks per public medical insurance policy, control group participants were observed during this 2-week period. Posttest data were collected in the same manner as baseline assessments after the 2-week observation. The length of the first stage was from September to November 2015.

In the second stage of the study, 25 stroke survivors were recruited into the intervention group from the same departments using the same method as the control group. To make the two groups comparable, a similar number of participants were recruited from the two departments. Baseline assessments, observation duration, and posttest of the intervention group were completed in the same manner as the control group. Length of the second stage was from December 2015 to February 2016. Research flow is described in Figure 1.

Intervention

Participants in the intervention group received both routine care and the mindfulness-based intervention. It was designed based on Eifert and Forsyth's (2005) centering exercise, a fundamental mindfulness practice that can assist in the preliminary development of mindfulness skill, relieve physical and psychological tension and comfort, and improve attention and commitment. The present study was based on Tang et al.'s (2007) research and incorporated a 2-week intensive mindfulness practice program, which included weekly 1.5-hour group practice sessions and individual daily practice (Table 1). Group practice sessions involving five to seven participants were conducted in treatment rooms of the two departments, with four groups having completed this program. Nonprofessional caregivers of participants were invited to participate during group practice sessions to promote their understanding of the program and to offer participant support. Individual practice sessions were provided to each participant in his/her room or other convenient locations.

The intervention was delivered by the first author, who completed a 2-month training program consisting of instructional theory, group practice, and individual consultation and four self-practice sessions at the Mental Health Center of Wuhan, prior to the research. This preparation was supervised by an experienced psychologist. An educational pamphlet was designed by researchers and provided to participants to help them understand the mindfulness-based practice and record daily practice.

The control group received routine care including physical therapy, occupational therapy, traditional Chinese medicine, and medication therapy. After the 2-week observation period, participants were offered a 1.5-hour group course about the mindfulness-based practice and the same educational pamphlet. Participants in the control group who were interested in the mindfulness-based practice were offered practice materials and guidance online after discharge.

Data Analysis

Data were sorted using Microsoft Excel and entered into SPSS 20.0 for statistical analysis. Demographic data were analyzed using descriptive statistics. To compare the two

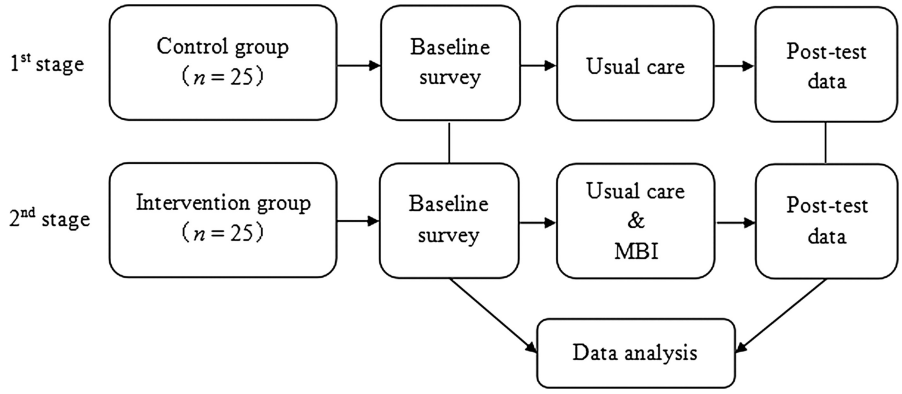

Figure 1. Research flow of the study. MBI = mindfulness-based intervention.

Table 1 The short-term mindfulness-based intervention modules

Week	Intervention Content
1st week	Group practice session (1.5 hours) 1. Distribution of educational pamphlet 2. Presentation of mindfulness and mindfulness-based practice 3. Group practice under the guidance of the first author 4. Sharing about the practice experience 5. Question/answer period Daily practice 1. Individual practice under the guidance of first author, 20 minutes/day 2. Practice assignment
2nd week	Group practice session (1.5 hours) 1. Review of previous week's session 2. Presentation of mindfulness-based practice in daily life and rehabilitation treatment 3. Group practice under the guidance of the first author 4. Sharing about the practice experience 5. Question/answer period Daily practice 1. Individual practice under the guidance of first author, 20 minutes/day 2. Integrate mindfulness practice into rehabilitation treatment 3. Practice assignment

groups, measurement data were analyzed by independent sample *t* test, and numerical data were analyzed by Chi-square test or Fisher's exact test. Baseline and posttest score comparison within each group was conducted by paired sample *t* test. A two-sided *p* value of <.05 was considered statistically significant, and results were presented using mean (*M*) and standard deviation (*SD*).

Results

Demographic and Clinical Characteristics

All participants were of Han ethnicity. Most were men, with 92% in the control group and 84% in the intervention group. Age of participants in the control group ranged from 26 to 77 years with a mean age of 61.12 years (*SD* = 12.23); in the intervention group, participants' ages ranged from 24 to 79 years with a mean age of 63.00 years (*SD* = 13.60). Most of the participants were retirees, 80% in the control group and 84% in the intervention group. The control group had 84% participants living in an urban area, whereas the intervention group had 92% urban residents. Among participants in the control group, 56% were cared for by spouses or family members, 36% were cared for by paid care workers, and 8% did not have a nonprofessional caregiver. In the intervention group, the corresponding rates were 60%, 36%, and 4%. The period since diagnosis of stroke of the control group ranged from 1 to 4 months with a mean duration of 1.92 (*SD* = 0.95) months, and the period since diagnosis in the intervention group ranged from 1 to 6 months with a mean duration of 2.08 (*SD* = 1.15) months. Demographic and clinical characteristics of participants in both groups are shown in Table 2, and Chi-square test indicated no statistical significance between the two groups related to these characteristics ($p > .05$).

Stroke Survivors' Mindfulness, Comfort, and Ambulation Ability

Mean baseline scores of the control group and intervention group on the MAAS, SGCQ, BBS, 10MWT, and FAC are shown in Table 3. No statistical significance on mindfulness, comfort, and ambulation ability between the two groups was detected using independent *t* test ($p > .05$).

Effect of the Short-term Mindfulness-Based Intervention on Mindfulness, Comfort, and Ambulation Ability

Posttest scores of the MAAS, SGCQ, and each of its dimensions, BBS, 10MWT, and FAC for both the control group and the intervention group significantly improved after a 2-week observation ($p < .01$; Table 4). Improvement in the MAAS score of the intervention group was greater than that of the control group ($p = .000$). The intervention group had a greater score in overall SGCQ ($p = .005$), as well as a greater score in the physical ($p = .004$) and sociocultural ($p = .006$) subscales of the SGCQ than the control group. The difference between the two groups in the psychospiritual subscale, as assessed by the posttest score

Table 2 Demographic and clinical characteristics of participants ($N = 50$)

	Control group ($n = 25$)		Intervention group ($n = 25$)			
Variables	*n*	%	*n*	%	χ^2	*p*
Educational background[a]					–	1.000
Primary school or below	2	8	2	8		
Middle or high school	14	56	15	60		
College or above	9	36	8	32		
Income monthly (in Yuan)					0.347	.556
<3,500	15	60	17	68		
≥3,500	10	40	8	32		
Type of stroke					0.089	.765
Ischemic	16	64	17	68		
Hemorrhagic	9	36	8	32		
Affected side of body					0.325	.569
Left	13	52	15	60		
Right	12	48	10	40		

[a]Analyzed using Fisher's exact test.

Table 3 Comparison of mindfulness, comfort, and ambulation ability between groups at baseline (N = 50)

Variables	*M* (*SD*) Control Group (n = 25)	*M* (*SD*) Intervention Group (n = 25)	t	p
MAAS	58.12 (5.60)	58.72 (5.41)	−0.385	.702
SGCQ				
Physical	17.92 (2.68)	18.44 (2.69)	−0.685	.497
Psychospiritual	27.56 (5.27)	29.72 (3.52)	−1.705	.095
Sociocultural	27.32 (3.71)	27.92 (3.19)	−0.614	.542
Environmental	27.36 (5.13)	26.40 (3.78)	0.754	.455
Overall	100.16 (12.81)	102.48 (10.62)	−0.697	.489
BBS	28.64 (7.69)	28.20 (7.86)	0.200	.842
10MWT	0.60 (0.04)	0.59 (0.04)	1.196	.237
FAC	1.32 (0.48)	1.20 (0.41)	0.957	.344

Note. MAAS = Mindful Attention Awareness Scale; SGCQ = Shortened General Comfort Questionnaire; BBS = Berg Balance Scale; 10MWT = 10-Meter Walk Test; FAC = Functional Ambulation Classification Scale.

of SGCQ, was comparatively smaller, but the score of the intervention group significantly outweighed that of the control group (p = .026). Posttest score of SGCQ in the environmental subscale showed no difference between the two groups (p = .245). Concerning ambulation ability, no significant difference was observed between the two groups in the BBS (p = .769), 10MWT (p = .139), and FAC (p = .803) scores (Table 5).

Discussion

Most stroke survivors undergoing inpatient rehabilitation were retired, male urban residents with a mean age greater than 60 years. This is consistent with epidemiological characteristics of patients experiencing a stroke, as reported in China (National Health and Family Planning Commission of the People's Republic of China, 2013). Clinical data indicated that most of the participants experienced an ischemic stroke with left-sided hemiplegia, which is similar to research findings in China (Zhao, Zhang, Lu, & Li, 2013). Demographic data showed that stroke survivors were mainly cared for by spouses or other family members, which is consistent with the research conducted by Yu, Hu, Efird, and McCoy (2013).

According to baseline assessments, stroke survivors in both groups were at a moderate level of mindfulness, which is similar to Li, Zhao, Chen, and Ma's (2015) study. Mindfulness is awareness of being in the present moment, which requires individuals to resolve emotional disturbances and ruminations using a nonjudgmental behavior and maintain a peaceful heart (Ludwig & Kabat-Zinn, 2008). Physical and psychological impairments poststroke, altered mobility and independence, complexity of treatment, and an unsuitable hospital environment may have led to participants having a negative experience and unhealthy emotions. This could have resulted in a moderate level of mindfulness. Participants having a low level of mindfulness could have given in to unhealthy feelings and devoted less time and effort to rehabilitation therapy. This could have led to lack of comfort during the inpatient experience. Li et al.'s (2015) study indicated that a 6-week mindfulness-based intervention program can be helpful to improve stroke survivors' mindfulness and promote physical rehabilitation. Tang et al. (2007) considered that even a 1-week intensive mindfulness-based practice can offer help to patients. However, their research was not conducted using stroke survivors.

In this study, a short-term mindfulness-based intervention program was used to help stroke survivors develop a primary mindfulness skill, improve comfort, and exert more effort in rehabilitation training in order to improve ambulation ability. It was found that after 2 weeks of observation, awareness of mindfulness of

Table 4 Comparison of mindfulness, comfort, and ambulation ability within groups posttest (N = 50)

Variables	*M* (*SD*) Control group (n = 25) Baseline	Posttest	t	p	*M* (*SD*) Intervention group (n = 25 Baseline	Posttest	t	p
MAAS	58.12 (5.60)	67.28 (5.76)	−9.420	.000	58.72 (5.41)	75.96 (4.53)	−14.962	.000
SGCQ								
Physical	17.92 (2.68)	21.80 (2.18)	−9.668	.000	18.44 (2.69)	23.44 (1.58)	−10.742	.000
Psychospiritual	27.56 (5.27)	34.88 (3.06)	−7.462	.000	29.72 (3.52)	37.00 (3.44)	−12.453	.000
Sociocultural	27.32 (3.71)	30.44 (2.33)	−6.636	.000	27.92 (3.19)	32.32 (2.32)	−9.526	.000
Environmental	27.36 (5.13)	31.52 (2.45)	−4.775	.000	26.40 (3.78)	32.32 (2.36)	−11.329	.000
Overall	100.16 (12.81)	118.64 (7.20)	−9.615	.000	102.48 (10.62)	125.08 (8.17)	−16.115	.000
BBS	28.64 (7.69)	37.28 (8.13)	−15.445	.000	28.20 (7.86)	37.96 (8.16)	−15.677	.000
10MWT	0.60 (0.04)	0.65 (0.04)	−14.326	.000	0.59 (0.04)	0.67 (0.04)	−24.028	.000
FAC	1.32 (0.48)	1.68 (0.56)	−3.674	.001	1.20 (0.41)	1.64 (0.57)	−4.342	.000

Note. MAAS = Mindful Attention Awareness Scale; SGCQ = Shortened General Comfort Questionnaire; BBS = Berg Balance Scale; 10MWT = 10-Meter Walk Test; FAC = Functional Ambulation Classification Scale.

Table 5 Comparison of mindfulness, comfort, and ambulation ability between groups posttest ($N = 50$)

Variables	*M* (*SD*) Control Group ($n = 25$)	Intervention Group ($n = 25$)	*t*	*p*
MAAS	67.28 (5.76)	75.96 (4.53)	−5.924	.000
SGCQ				
Physical	21.80 (2.18)	23.44 (1.58)	−3.044	.004
Psychospiritual	34.88 (3.06)	37.00 (3.44)	−2.303	.026
Sociocultural	30.44 (2.33)	32.32 (2.32)	−2.858	.006
Environmental	31.52 (2.45)	32.32 (2.36)	−1.176	.245
Overall	118.96 (7.20)	125.08 (8.17)	−2.957	.005
BBS	37.28 (8.13)	37.96 (8.16)	−0.295	.769
10MWT	0.65 (0.04)	0.67 (0.04)	−1.504	.139
FAC	1.68 (0.56)	1.64 (0.57)	−0.251	.803

Note. MAAS = Mindful Attention Awareness Scale; SGCQ = Shortened General Comfort Questionnaire; BBS = Berg Balance Scale; 10MWT = 10-Meter Walk Test; FAC = Functional Ambulation Classification Scale.

both groups was promoted, and the intervention group had a significantly higher mindfulness score than the control group. This demonstrates that a 2-week intensive mindfulness-based intervention program can improve mindfulness ability.

In the present study, it was found that stroke survivors' comfort was at a moderate level when they entered the hospital. After the mindfulness-based intervention, overall comfort level of the intervention group improved and was higher than the control group. Physical, psychospiritual, and sociocultural comfort levels of the intervention group improved, whereas the level of environmental comfort did not show significant improvement. This may be due to a mindfulness-based intervention relieving stroke survivors' clinical symptoms such as pain and fatigue and improving psychological and social condition (Davidson et al., 2003; Lawrence et al., 2013; Lazaridou et al., 2013; Li et al., 2015). A short-term mindfulness-based meditation cannot promote a stroke survivor's comfort with the hospital environment because of the complexity of the hospital environment. This finding suggests that nurses should be able to identify stroke survivors' comfort needs in relation to aspects in the environment and work closely with interdisciplinary teams in creating a safe and comfortable environment. This can provide enhanced stimulation, socialization, and motivation for stroke survivors to improve their participation in physical, cognitive, and social activity during inpatient rehabilitation (Aadal, Angel, Dreyer, Langhorn, & Pedersen, 2013; Pryor, 2010; White et al., 2014).

This study confirmed that stroke survivors who have impairments of ambulation ability required physical support with walking and had an urgent need for systematic ambulation rehabilitation. However, this study did not find the 2-week mindfulness-based intervention program could improve stroke survivors' ambulation ability. This may be due to the limited period of the intervention. Systematic reviews showed that a mindfulness-based intervention can improve stroke survivors' balance function and make stroke survivors more willing to do exercise (Lawrence et al., 2013; Lazaridou et al., 2013). This is important for improving stroke survivors' ambulation ability. Hölzel et al. (2011) found that a mindfulness-based intervention can increase participants' gray matter density in the brain's learning and memory processing area, which might be the material basis of motor relearning for stroke survivors in rehabilitation. These studies recommended a longer mindfulness-based intervention. Participants in the current study were limited to a 2-week mindfulness-based intervention because of their public medical insurance. Thus, the integration of a mindfulness-based intervention in the postdischarge care program of stroke survivors is warranted.

Although the modified mindfulness-based intervention program in this study did not significantly improved stroke survivors' ambulation ability, it effectively enhanced holistic comfort, especially in physical, psychospiritual, and sociocultural domains, which is viewed as a desirable outcome of an effective nursing intervention (Kolcaba, 1994). This finding supported the hypothesis that a 2-week intensive mindfulness-based intervention can have a positive effect on comfort of stroke survivors undergoing inpatient rehabilitation in China.

Limitations

Because of inevitable restrictions, this study has several limitations. Selection bias may have occurred in using a nonrandomized, nonconcurrent design and convenience sampling without blind method. A small sample size in one hospital limits the generalizability of findings to a broad population of stroke survivors. The 2-week duration of this mindfulness-based intervention may be inadequate to promote change in ambulation ability. A longer duration is recommended if research conditions permit.

Conclusion

Mindfulness and comfort levels of stroke survivors undergoing inpatient rehabilitation were moderate. Stroke survivors' ambulation function was mainly at the indoor-assisted ambulation level. Research findings demonstrated that integrating a 2-week mindfulness-based intervention into a rehabilitation program can significantly improve stroke survivors' mindfulness and comfort. It did not have any obvious effect on overall recovery of ambulation ability during hospitalization. Further studies are

Key Practice Points

- Comfort is important for stroke survivors undergoing inpatient rehabilitation.
- Nurses are trained to implement mindfulness-based interventions with stroke survivors.
- There is a need for nurses to create an improved environment for stroke survivors undergoing inpatient rehabilitation.
- A modified mindfulness-based intervention can significantly improve stroke survivors' mindfulness and comfort but does not significantly affect ambulation ability.

needed to explore the application of mindfulness in a rehabilitation program for stroke survivors from inpatient rehabilitation through to community-based rehabilitation after discharge.

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Contributions: Study design: MW, WJL, and XLC; data collection and analysis: MW; and manuscript preparation: MW, XLC.

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