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Research Article

The Effects of Mindfulness Meditation-Based Complex Exercise Program on Motor and Nonmotor Symptoms and Quality of Life in Patients with Parkinson's Disease

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Introduction

Among geriatric diseases, Parkinson's disease (PD) is the second most common chronic neurodegenerative disease [1]. Its prevalence rate has been reported to range from 2% to 3% for people aged 65 years or older and is expected to double by 2030 [1]. The symptoms of PD are characterized by tremors, muscle rigidities, and loss of postural reflexes [2]. Other symptoms include emotional disturbances (e.g., depression or anxiety), cognitive impairments (e.g., dementia or memory loss), sleep disturbance, and fatigue [3]. PD patients are prescribed dopamine-related drugs to control motor symptoms, but this can lead to secondary symptoms such as hallucinations and insomnia [2]. Therefore, developing a nursing intervention program and administering medications are critical to improve the quality of patients' lives.

Meditation is a mental exercise that affects the functioning of the body. It enables patients to control their attention and focus on their intentions and choices rather than be influenced and controlled by the external environment [4]. Mindfulness meditation in particular stimulates parasympathetic nervous system activity through the patient's deep breathing and has been shown to have a positive effect on concentration and emotional control [5].

In a meta-analysis of studies on the effects of mindfulness meditation conducted by Grossman et al [6], mindfulness meditation was found to be an effective regimen in cancer, psychiatric, cardiovascular, and chronic diseases. In Korea, mindfulness meditation research has been conducted on patients with depression, irritable bowel syndrome, breast cancer, diabetes, anxiety disorders, and drug abuse and has shown that mindfulness meditation has positive effects on emotional and psychological stability, depression, anxiety, and memory loss [7].

Past studies on PD have reported that exercise programs are effective in improving cardiopulmonary function, muscle strength, motivation to exercise, daily activities, walking, sleeping, and the quality of life in PD patients [8]. Exercise programs also enable patients to improve balance and flexibility to prevent falls and injuries [9].

However, exercise programs alone may not be able to improve the emotional disturbances that accompany PD. So far, intervention studies for PD patients conducted in Korea have mainly focused on mobility functions, ignoring nonmotor symptoms such as emotional disturbances, cognitive functions, and sleep disorders. To improve the overall health and quality of life of PD patients, it is imperative to develop a balanced integrative program that addresses both the motor and nonmotor symptoms of PD patients.

The purpose of this study is to develop a complex exercise program based on mindfulness meditation and to evaluate the effects of the program on the motor and nonmotor symptoms of PD patients. The hypothesis of the study was that there would be a difference between the experimental group and the control group participating in the meditation-based exercise program. The variance was hypothesized in terms of mobility, depression, anxiety, cognitive functions, activities of daily living, and quality of life.

Methods

Study design

The purpose of this study is to investigate the effects of a meditation-based exercise program on the motor and nonmotor symptoms in patients with PD using a quasi-experimental design.

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Experimental application

Mindfulness-based stress reduction (MBSR) [10], the most widely used method among mindfulness training programs, has been used to treat depression caused by physical discomfort and increased chronic pain. By stimulating the brain's amygdala, MBSR induces regulation of positive emotional experiences. MBSR is also known to activate the parasympathetic nervous system, which leads to the regulation of relaxation and stress.

For intervention, this study developed the mindfulness meditation-based complex exercise program (MMBCEP), an integrative program that combines MBSR with the senior fitness test manual [11]. MBSR was incorporated to alleviate depression and anxiety and to boost the self-efficacy of PD patients, while the senior fitness test manual was expected to improve the patients' muscle endurance, muscle strength of upper and lower extremity, coordination, agility, and balance. To ensure the appropriateness of this program for PD patients, the researcher consulted a physiotherapy professor, a clinical psychologist, a neurologist, a nursing professor, and a nurse in neurology. First, the physiotherapy professor advised on the modification of the senior fitness test model to accommodate the physical constraints of PD patients. Second, the clinical psychologist provided guidance on the mindfulness meditation program to treat psychological symptoms of PD patients. Third, the whole program was evaluated by a neurologist, a nursing professor, and a nurse in neurology to determine whether it was suitable for PD patients.

This 2-hour program, conducted in a group setting, consisted of the preparation phase, the complex exercise phase, the meditation phase, and the wrap-up phase (Table 1).

1) Preparation phase: The participants exchanged greetings with one another and reported how much they conducted MMBCEP at home.
2) Complex exercise phase: Before starting the complex exercise program, the participants stretched their body in the following order: neck, shoulders, upper body, arms, legs, and ankles. Then, using an elastic band (MSD-band; 15 cm × 180 cm), they worked on the upper extremity (shoulders, arms, and wrists), trunk, and the lower extremity (thighs, legs, and ankles). After this, the participants engaged in a ball exercise using a small-sized ball (Gymnic; 22 cm). This ball exercise consisted of placing a ball between the knees and lifting the ball with the knees, tossing the balls to partners, leaning the ball against the wall, and sitting down on the ball and standing up. For cooling-down exercises, the participants repeated the stretching with deep breaths.
3) Meditation phase: In the first week, the participants were given a 30-minute talk on meditation and the basic breathing training. After that, breathing meditation (Week 2), breathing meditation and loving-kindness meditation (Week 3), breathing meditation and imaginary training (Week 4), and breathing meditation, loving-kindness meditation, and imaginary training (Week 5~8) were taught.
4) Wrap-up phase: The participants were served with warm water and took a 5-minute break. They then shared how they felt after MMBCEP.

Training of the researcher and research assistants

Before this study, the researcher completed 24 hours of basic program training and 48 hours of intensive training of the mindfulness meditation conducted by the Korean Society for Meditation. For this study, the researcher trained six research assistants (RAs) about MMBCEP and supervised their administration of the program on the same patient over multiple sessions. Four of them were in charge of the motor symptoms measurements (muscle endurance, muscle strength of upper and lower extremities, and balance) and two of them were in charge of assisting the participants. To enhance consistency, each RA measured one motor symptom throughout the study period.

Preliminary study

Before the study, three sessions of MMBCEP were conducted with three PD patients to determine whether the program was appropriate for PD. All three sessions of MMBCEP were approved for their appropriateness for PD patients by a research supervisor, a neurologist, a meditation expert, and a nursing professor. Data were collected about the demographics, emotions, and cognitive functions of the experimental and the control group using structured questionnaires.

Setting and sample

Participants and ethical considerations

The participants of this study were PD patients who were undergoing outpatient treatment in the neurology clinic of a university hospital in South Korea. The following criteria were used to recruit the participants: (1) those within stage 1 ~ 3 in the Hoehn & Yahr Scale [12], (2) who regularly visited the hospital as outpatients, (3) who were recommended by a doctor based on their ability to communicate and their clinically stable condition, (4) who were able to walk independently, and (5) who had not received any alternative therapies such as aromatherapy, acupuncture, laughter therapy, or foot reflexology. The questionnaire was completed by the participants. The researcher read the questions to patients who had reading difficulties due to visual impairments.

This study was approved by the institutional review board ethics committee of a university in Korea (IRB No. KU-IRB-14-82-A-1). Participation was voluntary. The written informed consent forms outlining the details of the study and the confidentiality and privacy of personal information were obtained from all participants before commencing the study.

The sample size for the participant selection was calculated as 26 for each group by using the G*power 3.1.2 program: the factors were the group number = 2, the size of the effect (f) = 0.70 (p = 0.05), power = 0.80. Among the 76 PD patients who were recruited, 13 were later excluded as they did not meet the criteria, and three in the control group withdrew due to personal reasons. The final sample size was 63 (33 in the experimental group and 30 in the control group).

Because PD patients are physically and emotionally challenged, retaining the study participants was a critical issue for this study. The present study used several retention strategies. First, a day before each session, the research team gave a call to the participants to remind them of the session. Second, the participants received taxi fares as an incentive for their participation. It is very important to provide comfortable and safe transportation for PD patients due to their mobility impairment. Third, after each session, a courtesy call was made to the participants, inquiring about their overall well-being and encouraging them to conduct MMBCEP at home. Finally, the participants were given an elastic band and a booklet which described MMBCEP with text and pictures. These strategies were effective in retaining the participants as well as encouraging them to conduct MMBCEP at home. The control group received the usual care at the hospital during the intervention period. After the experimental group completed the 8-week MMBCEP, the control group received the same MMBCEP for 6 weeks. Figure 1 illustrates the patient recruitment and assignment process.

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