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Effects of yoga therapy on postural stability in patients with schizophrenia-spectrum disorders: A single-blind randomized controlled trial

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ABSTRACT

Introduction: Postural instability is a serious concern in patients with schizophrenia-spectrum disorders since it is expected to increase the risk of falls that may lead to fractures. The impact of yoga therapy on postural stability has not been investigated.
Methods: In this eight-week single-blind randomized controlled study with an eight-week follow-up, outpatients with schizophrenia or related psychotic disorder (ICD-10) were randomly assigned to either yoga therapy or a control group. In the yoga therapy group, the subjects received weekly sessions of 60-min yoga therapy for eight weeks in addition to their ongoing treatment. In the control group, the subjects received a weekly regular day-care program. The assessments that were performed at the baseline and endpoint included the Clinical Stabilometric Platform (CSP), anteflexion in standing.
Results: Forty-nine patients participated in this study (32 men; mean ± SD age, 53.1 ± 12.3 years): yoga therapy group ($n = 25$) and control group ($n = 24$). In the yoga group, significant improvements were observed in a total length of trunk motion, the Romberg ratio, and anteflexion in standing at week 8 (mean ± SD: 63.9 ± 40.7–53.4 ± 26.2 cm, 1.6 ± 0.9–1.1 ± 0.6, and −8.7 ± 9.5 to −3.8 ± 12.4 cm, respectively) while there were no significant changes in the control group. However, those clinical gains returned to the baseline level at week 16.
Conclusions: The results confirmed the beneficial effects of the yoga therapy on postural stability in patients with schizophrenia. However, the therapeutic effects seemed transient, which warrants further investigations on strategies to sustain the improvements.

1. Introduction

Yoga has been practiced for several millennia and consists of a wide variety of components that include ethical lifestyle, spiritual practice, physical exercise, and practice of meditation (Iyengar, 1996). The effectiveness of yoga has recently gathered wide attention as a complementary treatment in psychiatric diseases such as depression (Uebelacker et al., 2010), obsessive compulsive disorder (Kirkwood et al., 2005), and anxiety disorder (Saeed et al., 2010). In fact, one recent meta-analysis demonstrated its effectiveness for those major psychiatric disorders (Cabral et al., 2011). As for schizophrenia, there have been only five randomized controlled trials (RCTs) that investigated the efficacy of yoga therapy (Behere et al., 2011; Duraiswamy et al., 2007; Vancampfort et al., 2011; Visceglia and Lewis, 2011; Xie et al., 2006). Based on the favorable results of those previous RCTs, Vancampfort et al. concluded in their systematic review that yoga therapy in combination with regular pharmacological intervention could reduce both the positive and negative symptoms and also improve the quality of life in patients with schizophrenia (Vancampfort et al., 2012). On the other hand, Cramer et al. reviewed the effect of yoga therapy on psychopathology, the quality of life, function, and hospitalization in their meta-analysis (Cramer et al., 2013). While

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they found that yoga therapy is moderately effective on quality of life, compared to usual care programs. They concluded that no recommendations could be made regarding yoga therapy as a routine intervention for schizophrenia. However, their conclusion was based on only four RCTs (Behere et al., 2011; Duraiswamy et al., 2007; Visceglia and Lewis, 2011; Xie et al., 2006). Furthermore, any of the previous five studies failed to include any physical components as the outcome of interest for patients with schizophrenia.

Patients with schizophrenia suffer from postural instability when compared to healthy people due to psychotropic medications and possibly the disease itself (Koreki et al., 2011; Marvel et al., 2004; Tsunoda et al., 2010). The lack of postural stability is a serious concern since it is expected to increase the risk of falls that may lead to fractures, which could turn out to have fatal outcomes (Hien le et al., 2005; Ray et al., 1987). Therefore, it is critically important to improve and maintain postural stability in patients with schizophrenia in order to prevent such unfavorable consequences. Yoga includes a variety of movements and poses that focus on the pivot of the body, which is practiced in coordination with breath control, meditation, and lifestyle (Iyengar, 1996). As a result, yoga has been considered to improve the balance of the body as well. Indeed, previous clinical trials have demonstrated the effectiveness of yoga in the gait and the balance and flexibility of the body in older adults (Roland et al., 2011; Schmid et al., 2010; Zettergren et al., 2011). Thus, the yoga therapy could have the potential to improve postural stability and flexibility of the body also in patients with schizophrenia.

The purpose of eight-week single-blind RCT is to examine the effects of yoga therapy on postural stability, and flexibility of the body in patients with schizophrenia, which has not been the topic of previous investigations to the best of our knowledge. We also performed an eight-week follow-up assessment after the intervention to examine whether the effects of the intervention would be persistent or only transient.

2. Methods

2.1. Study design

This eight-week single-blind RCT with a follow-up of another eight weeks was conducted in the Department of Neuropsychiatry, Yamanashi Prefectural Kita Hospital, Yamanashi, Japan, from June to October 2012. This study was approved by the institutional review board of the hospital, and subjects provided written, informed consent after receiving detailed information about the protocol. The study was registered at the University Medical Information Network Clinical Trial Registry (Identifier: UMIN 000008201).

2.2. Subjects

Outpatients who were diagnosed with schizophrenia or related psychotic disorder (F20–F29 according to the International Classification of Diseases, the 10th edition) (World Health Organization, 1992) and 18 years or older, had been receiving the same medications for the previous eight weeks, and were registered in the day-care center in this hospital were approached for participation in this study. Subjects incapable of providing consent, and those with current substance or alcohol abuse/dependence were excluded; no other exclusion criteria were applied to ensure representativeness of the sample in the real-world clinical setting.

2.3. Interventions

The subjects were randomly assigned to either of the following two groups: a yoga therapy group and a regular day-care group. Randomization with a usage of sealed opaque envelopes was performed by (Drs. R.M., A.K., H.S., H.T., and N.N.), at the Yamanashi Prefectural Kita Hospital who were not involved in this study. The randomization list without any stratification or blocks was made with a use of computer program, and opaque envelopes were opened after the baseline assessment. Subjects who were assigned to the yoga group received a weekly one-hour yoga therapy between 9:30 and 10:30 A.M. on Mondays (a total of eight sessions) in a gymnasium of the hospital. Those sessions were instructed by one of the investigators (S.I.) who held a master's degree of yoga and provided as an adjunctive to the ambulatory treatment, including pharmacotherapy and routine, non-structured clinical management. Each session consisted of gentle yoga stretches and simple movements in coordination with breathing as follows: warm-ups and loosening-up exercises (gentle movements of major muscle groups, joint rotations and self-massage), asana (twisting poses, standing poses and sun salutation), deep relaxation (corpse pose) and breathing exercises (see Supplementary Table 1 for details). After completion of the eight-week intervention, they received regular day-care programs, but did not receive any yoga therapy until another assessment was performed at week 16. In the control group, the subjects received a weekly regular day-care program (e.g. social skills training, and psycho-education) for eight weeks. Following the completion of the eight-week observation, the subjects in the control group were provided an opportunity to attend yoga sessions outside the present RCT when they wished. Medications were kept constant by subjects' treating psychiatrists throughout the study period unless a change was clinically indicated.

2.4. Outcomes measures

2.4.1. Primary outcome

The primary outcome measure was postural sway that was measured using the Clinical Stabilometric Platform (CSP) (ANIMA® GS-7, Tokyo, Japan) between 9:30 and 11:30 A.M. at baseline and at week 8 in both groups. This device measures the range of the trunk motion by evaluating the resistance applied to the platform for 30 s with eyes closed, feet together, and arms at sides. The position of the center of pressure (COP) as the subject stands on the platform was calculated from forces and moments. The outcome measure was a measure of COP sway area surrounded by an outer line, which was automatically calculated by this device and shown as values in cm^2. A smaller range indicates a better stability. A Romberg ratio was defined as a ratio of sway areas performed with eyes open and eyes closed.

2.4.2. Other effectiveness measures

Anteflexion in standing was also evaluated; a greater value indicates better flexibility. The subjects were requested to reach down toward the floor at the front of their feet with their knees extended, as far as possible. The distance between the tip of their middle finger and the floor was measured by one of the investigators (S.I.). The following assessments were also performed: the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987), the Drug Induced Extrapyramidal Symptoms Scale (DIEPSS) (Inada, 1996), the Functional Assessment for Comprehensive Treatment of Schizophrenia (FACT-Sz) (Suzuki et al., 2008), the EuroQol 5 dimensions (EQ-5D) classification system (Brooks, 1996), and coefficient of variation R–R interval (CVRR) at rest on electrocardiography to assess cardiorespiratory control system and autonomic nervous function (Murata and Araki, 1996). The EQ-5D also includes a visual analogue scale to provide a quantitative measure of health as judged by the individual respondents, which ranges from 0 to 100; a greater score represents better subjective health conditions. In the yoga group, follow-up assessments were made at week 16. All assessments were performed by trained psychiatrists who were blind to a