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Full Length Research Paper

Efficacy of meditation with conventional physiotherapy management on sub-acute stroke patients

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The use of meditation has long been recommended for medical treatment. Current study was to determine the effect of meditation additions to the conventional protocol that aim to enhance stroke patient's responses to depression, balance, disability and fatigue. A total of 10 sub-acute stroke patients with mean age of 55.2 ± 4.3 years participated in this study. As per inclusion criteria, the patients were randomly divided into two groups, group A and B (n=05) in each group. Group-A participants were undergone meditation for 20 min, whereas, group-B considered as control group, both groups undergone a standard conventional physiotherapy regime; a total interventional regime which consisted of 4 sessions per week for 28 days. Study outcomes such as depression, balance, disability and fatigue were assessed at baseline on the 14th and 29th day. A follow up was done after one week, that is, on the 37th day. The result of the study reported that disability, depression, fatigue and balance improved in both groups. Although, the patients in group A, who underwent meditation showed highly significant improvement (p>0.001) than group-B, who underwent conventional physiotherapy only. A follow-up effect improvement was retained in group-A even after the meditation was not being given till the 37th day of post intervention. The study concluded that meditation along with conventional physiotherapy management is more effective than conventional physiotherapy alone in the management of stroke. Thus, in post stroke rehabilitation, meditation should be incorporated in the management regime of stroke patients.

Key words: Meditation, stroke, depression, balance, disability, fatigue.

INTRODUCTION

The stroke incidence has increased in recent years. Regarding its mortality, the stroke ranks third in causes of permanent disability, being the main cause of permanent disability in Western countries (Kjeldsen, 2002; Frey et al., 1998). Stroke is associated with cognitive dysfunction and functional impairment, leading to difficulties in walking and interference in aspects related to depression and social features (Moon et al., 2004). Thus, the presence of depression and anxiety should be appropriately treated, where the focus of intervention should be to improve functional aspects (Kimura, 2000).

Despite evidence that participation in formal rehabilitative therapies lessens disability after stroke, studies have been reported that less than a third receive inpatient or outpatient therapies (Stroke Unit Trialists' Collaboration, 2009). Of those who do access therapies, the frequency of use varies by geographic location and socio-economic status. Standard rehabilitative therapies include selective muscle strengthening by isometric and isokinetic exercises to improve the power and endurance of affected and unaffected muscle groups. Sets of moderate resistance exercise with weights or elastic bands are feasible for most patients, simply, standing up and sitting down 5 to 10 times. Aerobic exercise training, whether by treadmill, over ground walking or recumbent cycling can produce a conditioning effect and increase walking speed

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Table 1. Meditation protocol.

S/No.	Meditation protocol	Time duration: 20 min
1	Corpse posture/ savasana (lying supine)	5 min
2	Ujjayi - 3 sets of slow and deep breathing technique	2-4 breath/min
3	Bhastrika - 3 sets of vigorous and fast breathing	20-30 breaths/min
4	Combined	-
4a	Slow breath	20 breaths/min
b	Medium breath	40-50 breaths/min
c	Fast breath	60-80 breaths/min
5.	Corpse posture/ savasana (lying supine)	5 min

and endurance (Brazzelli et al., 2011). Falls are a common outcome for patients recovering from stroke, with an incidence of over 40% for more than one fall in the first year (Weerdesteyn et al., 2008).

Practices of relaxation techniques refer to any method, process, procedure, or activity that helps a person to relax, to attain a state of increased calmness, or otherwise reduce level of stress. Although, there are various meditation styles, all types of meditation practices incorporate self-observation of mental activity, training in attentional focus, and cultivation of an attitude that emphasizes process rather than content (Bedford, 2012).

Mindfulness-based stress reduction, a program that has grown in popularity, uses awareness of body sensations and focused breathing to calm the mind and give the individual non-judgmental awareness of bodily experiences (Ospina et al., 2007). The central component of mindfulness is acquisition of attentional control by focusing on events generated internally (bodily sensations, breaths, thoughts and emotions) and externally (sights and sounds) at the current moment, with non-judgmental acceptance. Concentration meditation entails directing attention to some intentional processes like the repetition of a word or phrase (mantra), or to breathing. In some clinical trials, meditation has been used to relieve symptoms such as pain, fatigue, and sleep disturbance by redirecting focus away from the symptom experience, toward strengths and positive thoughts, and also by eliminating the evaluation or judgment of sensations associated with the symptom (Chang et al., 2010; Ross, 2011).

A convergent line of neuroscientific evidence suggests that meditation alters the functional and structural plasticity of distributed neural processes underlying attention and emotion. Long-term meditators have structural differences in both gray and white matter (Kang et al., 2013). Meditation can be conceptualized as a family of complex emotional and attentional regulatory training practices developed for various ends. Recently, the therapeutic use of meditation, including mindfulness-based techniques has become increasingly important in the treatment of physiological and psychological conditions (Ludwig and Kabat-Zinn, 2008).

There are various treatment approaches to the rehabilitation of stroke patient with hemiplegia. Physiotherapy treatment must commence immediately after its onset. The current study was to determine the effect of meditation training additions to the conventional protocol that aim to enhance stroke patient's responses to depression, balance, disability and fatigue.

MATERIALS AND METHODS

Ten patients with sub-acute stroke were enrolled in this study with mean age of 55.2 ± 4.3 years from various hospitals, Delhi NCR region. These patients were diagnosed with at least 3 to 12 months of their clinical stroke since their first (and only) left-hemisphere stroke. Patients were selected based on following inclusion criteria, age between 50 to 70 years, Mini Mental Status Examination Score (MMSES) of at least 24 and Orpington prognostic scale score of mild stroke. Patients were excluded based on presence of uncontrolled hypertension, any medical contra-indication for rehabilitation, hearing Orpington prognostic scale score defects and MMSES below 24.

Prior to the study, interventional procedures were explained to subjects and obtained consent form. After considering the inclusion criteria, the patients were randomly divided into two groups, group A and B (n=05) in each group. Subjects in group-A participants were made to undergo meditation training (Table 1) for 20 min, whereas, group-B was considered as the control group; both groups underwent a standard conventional physiotherapy regime with a total interventional regime consisting of 4 sessions per week for 28 days. Interventions were observed and corrected in case of any discrepancy to ensure consistent performance by experts in meditation. Patients were instructed to avoid any other form of yoga/relaxation therapies during the study period and also not to increase the intensity or frequency of interventions during the study period. Study outcomes such as depression, balance, disability and fatigue were assessed by Hamilton Rating Scale for depression, berg balance scale, barthel activities of daily living index and fatigue severity scale respectively, at baseline on the 14^{th} and 29^{th} day. A follow up was done after a week, that is

Table 2. Outcomes between groups.

Group A	0 Day	14 Day	29 Day	37 Day	0-14	0-29	0-37
HRSD	66.0 ± 4.18	70.0 ± 5.0	72.0 ± 2.74	74.0 ± 4.18	0.02	0.00	0.00
BBS	34.8 ± 2.28	36.0 ± 2.55	37.0 ± 2.35	37.4 ± 2.51	0.03	0.00	0.00
BI	37.8 ± 1.8	36.0 ± 1.58	37.6 ± 2.51	32.0 ± 2.9	0.00	0.00	0.01
FSS	17.6 ± 2.7	15.6 ± 3.78	12.4 ± 2.9	12.2 ± 2.86	0.22	0.01	0.00
Group B							
HRSD	67.0 ± 4.47	68.0 ± 4.47	71.0 ± 5.48	73.0 ± 4.47	0.37*	0.01	0.00
BBS	32.8 ± 2.28	33.6 ± 2.88	34.8 ± 3.03	35.8 ± 2.68	0.10*	0.02	0.00
BI	38.4 ± 2.07	37.2 ± 2.28	36.6 ± 2.30	36.0 ± 1.58	0.11*	0.03	0.02
FSS	20.4 ± 2.88	19.2 ± 2.59	17.8 ± 2.28	16.8 ± 2.17	0.03	0.02	0.001
Group A and B							
p-value	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-

* Non- significant.

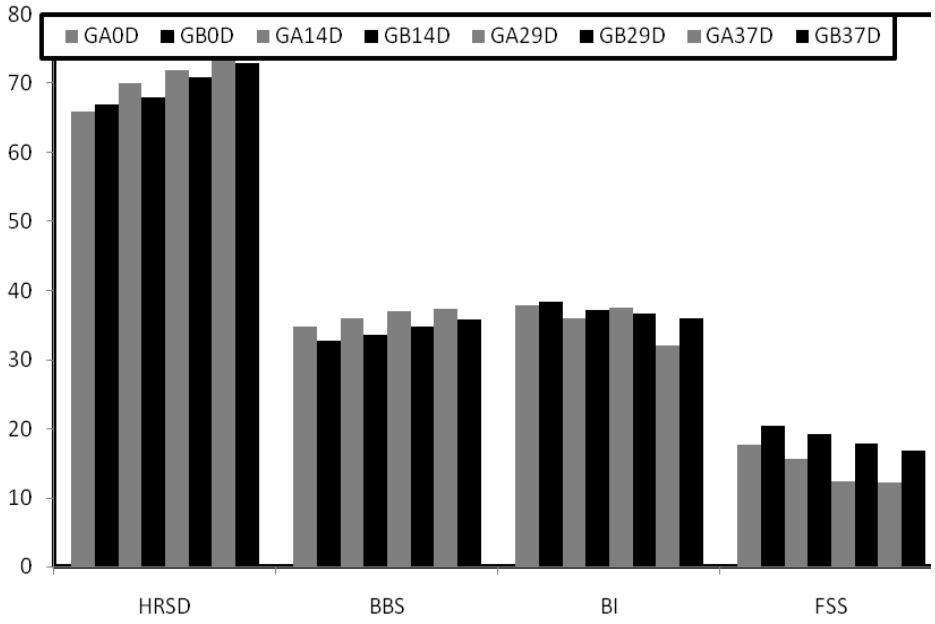

Figure 1. Outcomes between groups.

on the 37th day.

RESULTS AND DISCUSSION

Statistical analysis was performed by using the software package SPSS 16.0. The mean and standard deviation of all the variables were analyzed. The t-test analysis was done for both the groups for depression, balance, disability and fatigue variables. The result of the study observed that disability, depression, fatigue and balance improved in both groups. Although, the patients in group A, who underwent meditational training showed highly significant result (p>0.001) than group-B who underwent conventional physiotherapy alone. A follow-up effect improvement was retained in group-A, even after the meditation was not being given and conventional therapy continued for all groups till the 37th day of post intervention (Table 2).

To our knowledge, this is the first study to investigate the effect of meditation additions to the conventional protocol that aim to enhance stroke patient's responses to depression, balance, disability and fatigue (Figure 1). The major findings of the present study were as follows: (i) The result of our study demonstrates that disability, depression, fatigue and balance improved in both groups,

that is, with meditation training and conventional physiotherapy, (ii) group A, who underwent meditation training showed highly significant improvement than group B and (iii) Follow-up effect was retained in meditation group, even after the intervention was not being given.

The most striking finding of the present study was meditation training showing highly significant improvement in addition to the conventional physiotherapy alone. Previous studies have repeatedly reported that meditation training can enhance various cognitive processes, such as emotional regulation, executive control and attention, particularly, sustained attention (Zeidan et al., 2010; Jung et al., 2010). Therefore, balance improvement may be associated with their enhanced cognitive functions through meditation training, such as improved attention and self-perception. Based on the findings from previous studies, we speculate that brain regions showing significantly thicker cortices in meditators than controls, such as the cortex and temporal areas, may be associated with their improved executive control.

Goto et al. (2010) reported that the altered synaptic structure of the brain circuits associated with attention and emotion might be one of the essential pathophysiological conditions underlying some major psychiatric disorders such as schizophrenia and depression. However, a convergent body of neuroscientific evidence suggests that meditation alters the function and structure of distributed neural processes underlying attention and emotion (Brefczynski-Lewis et al., 2007; Pagnoni and Cekic, 2007; Lutz et al., 2008). A study investigated 22 active practitioners of meditations, including Zazen, Samatha and Vipassana and found larger gray matter density in the orbitofrontal cortex, which is related to emotional regulation processing (Quirk and Beer, 2006). These observations might support the result of reduction depression in the present study.

A possible explanation for present findings for improvement in functional ability and decrease in fatigue supported by previous study reported that meditation practitioners showed thicker cortical thickness in the region adjacent to the primary motor area as well as, a positive trend between cortical thickness in this region and practice duration. This region is involved in the control and execution of voluntary motor functions (Toma et al., 1999). The superior frontal cortices are regions of the brain that are typically involved in the regulation and monitoring of attention (Tang et al., 2007).

Recent functional Magnetic Resonance Imaging (MRI) studies have reported greater activation in these regions in experienced meditators during meditation (Brefczynski-Lewis et al., 2007; Hölzel et al., 2007). Taken together, it can be suggested that the meditation training we used involved primarily in attention processing and self-perception and secondarily in emotional processing. The increase of dopamine associated with meditation training through improved antioxidant status (Sharma et al., 2008), may contribute to dopaminergic neurogenesis.

There were no significant correlations between anatomical changes and practice duration. Previous studies have reported inconsistent findings, showing positive correlation between grey matter volumes and training duration (Grant et al., 2010) or no correlations (Luders et al., 2009). In addition, even if all meditators practiced in one particular style, they are engaged differently in their mental exercises. Based on previous observations, training intensity may affect brain structures than the total number of years of practice. Clearly, longitudinal studies will be necessary to determine the differences in meditators.

Conclusion

The study concluded that meditational training along with conventional physiotherapy management is more effective than conventional physiotherapy alone in the management of stroke. Thus, in post stroke rehabilitation meditational training should be incorporated in the management regime of stroke patients.

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