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Review article

Evidence based effects of yoga in neurological disorders

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ABSTRACT

Though yoga is one of the widely used mind-body medicine for health promotion, disease prevention and as a possible treatment modality for neurological disorders, there is a lack of evidence-based review. Hence, we performed a comprehensive search in the PubMed/Medline electronic database to review relevant articles in English, using keywords "yoga and neurological disorder, yoga and multiple sclerosis, yoga and stroke, yoga and epilepsy, yoga and Parkinson's disease, yoga and dementia, yoga and cerebrovascular disease, yoga and Alzheimer disease, yoga and neuropathy, yoga and myelopathy, and yoga and Guillain-Barre syndrome". A total of 700 articles published from 1963 to 14th December 2016 were available. Of 700 articles, 94 articles were included in this review. Based on the available literature, it could be concluded that yoga might be considered as an effective adjuvant for the patients with various neurological disorders.

1. Introduction

Mind-body therapies are a form of complementary and alternative medicine (CAM). The National Center for Complementary and Alternative Medicine (NCCAM) defines mind-body medicine as techniques designed to 'enhance the mind's capacity to affect bodily function and symptoms' [1]. Mind-body therapies focus on the relationships among the brain, mind, body, and behavior, and their effect on health and disease [2]. These practices often offer stress relief and relaxation. Neurological conditions may be exacerbated by stress, and thus among American adults, mind-body therapies were used more frequently with common neurological conditions than among those without and more often when conventional treatments were perceived ineffective. Of the mind-body therapies, yoga, deep breathing exercises, and meditation were commonly used most, while biofeedback, hypnosis, and qi-gong were used least [1].

Yoga is an ancient Indian, non-religious mind-body approach [2] classified as a form of CAM by the National Institutes of Health [3]. It consists of the practice of specific posture (asana), regulated breathing (Pranayama) and meditation [4]. The practice of yoga integrates the physical, mental, and spiritual components of an individual in order to improve health and well-being [3]. There are various review articles reporting the effect of mind-body medicine in various neurological disorders [1,2]. But, even though yoga is one of the widely used mind-body medicine [1], for health promotion and disease prevention and as a possible treatment modality for neurological disorders [5]. There is a lack of evidence-based review on the effect of yoga practices in various neurological conditions and thus, this review was performed, aiming at providing a comprehensive background for the scientific evidence based effect of yoga in various neurological disorders.

2. Methods

We performed a comprehensive literature search in the PubMed/Medline electronic database to review relevant articles in English, using keywords "yoga and neurological disorder, yoga and multiple sclerosis, yoga and stroke, yoga and epilepsy, yoga and Parkinson's disease, yoga and dementia, yoga and cerebrovascular disease, yoga and Alzheimer disease, yoga and neuropathy, yoga and myelopathy, and yoga and Guillain-Barre syndrome". A total of 448, 54, 50, 38, 28, 27, 19, 7, 19, 9, & 1 (grand total 700) articles published from 1963 to 14th December 2016 were available in respective to the above-mentioned keywords. Of 700 articles, 94 articles that fit into the following inclusion and exclusion criteria were reported in this review. *Inclusion criteria:* clinical trials, controlled trials, randomized controlled trials, systematic reviews and meta-analysis that are dealing with yoga in combination with or without other therapies. *Exclusion criteria:* Research protocols, comments, erratum, articles that do not have either abstract or full text in English, Similar articles, articles with a lack of information.

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3. Practice of yoga and its effects in various neurological disorders

3.1. Yoga in stroke

Stroke is one of the most prevalent diseases worldwide causing devastating impairments and negative consequences for survivors [6]. In low-mid income countries, stroke is the second leading cause of cognitive and physical disabilities [5]. Moreover, it is the main cause of adult-onset disability among people and the cost for care is among one of the fastest-growing Medicare expenses. Post-stroke therapy may improve recovery and reduce long-term disability [6]. Since strokes occur suddenly with effects lasting a lifetime, methods to prevent strokes and to help patients rehabilitate are needed, one of which, with increasing fervor, is yoga [5].

Yoga seems to offer a relief from a long list of medical ailments in stroke by alleviating both the mind and the body from stress. Yoga and meditative practices act on both the psychological and physical levels, and improvements have been noticed in patients' mindsets. Improvement in the mindsets of people with the disease can potentially lead to a change in behavior and ultimately an improvement in health [6]. Impairment in balance is common after stroke. Previous studies on 8 week (twice per week) yoga-based rehabilitation have shown to potentially improve multiple post-stroke variables such as significant improvement in balance (Berg Balance Scale), fear of falling [7], pain, range of motion of neck and hip, upper extremity strength, and 6-min walk scores in patients with chronic stroke [8].

In a study, 8 week (twice per week) of both yoga and group occupational therapy was considered feasible, as individuals were able to safely complete the intervention with little attrition and high attendance; and shown as a potential intervention to improve multiple fall-related outcomes such as improvement in balance by 30%, balance self-efficacy by 15%, Fall Prevention and Management Questionnaire by 29%, and Fall Prevention Strategy Survey by 42% in people with stroke [9]. In another study, 10 week practice of yoga has reported to produce physical improvements in terms of strength and range of movement or walking ability; psychological improvement in terms of improved sense of calmness and social improvement in terms of the possibility of reconnecting and accepting a different body [10]. Compared with usual care, yoga resulted in a significant improvement in exercise capacity and in health related quality of life (QOL) [11]. Mood disorders are prevalent in people after stroke, and a disorder's onset can exacerbate stroke related disabilities [12]. Whereas practice of yoga has shown to reduce the symptoms of anxiety [11] and practice of yoga combined with exercise has shown to be feasible, safe, acceptable and effective in improving mood in patients with stroke. Moreover, the study reported no adverse events and high compliance in the yoga program [12]. Hence, participation in yoga-based programs can provide a number of meaningful physical, psychological and social benefits and support the rationale for incorporating it into a formal stroke rehabilitation programs [10].

3.2. Post stroke hemiparesis

A study on 8 week (twice per week) practice of yoga based exercise program has reported to improve Berg Balance Scale and the Timed Movement Battery [13], while another study on 10 week yoga has reported to have promising role in improving mental health and QOL in people with chronic post-stroke hemiparesis [14].

3.3. Post-Stroke aphasia

A study on 12 week (twice a week) practice of Kundalini Yoga has shown to be effective in improving O'Connor Tweezer Dexterity test, a timed test where the participant places pins in a Peg-Board with tweezers, and the Boston Aphasia Exam for speech in stroke [15]. In another study, 3 month practice of yogic breathing techniques along with body manipulations, and ingestion of coconut oil has shown to be effective in improving language, visual attention, and mood measures in a patient with post-stroke aphasia [16].

3.4. Yoga in Parkinson's diseases

Parkinson's disease (PD) is the second most common neurodegenerative disorder caused by the selective and progressive loss of dopaminergic neurons in the substantia nigra pars compacta [17]. No conventional treatment has been convincingly demonstrated to slow or stop the progression of PD. Dopaminergic therapy is the gold standard for managing the motor disability associated with PD [18]. Non-motor symptoms of PD, such as cognitive, neuropsychiatric, sleep, autonomic and sensory disturbances caused by intrinsic PD pathology or drug-induced side effects, are gaining increasing attention and urgently need to be taken care of due to their impact on QOL [19]. Perhaps for this reason, an increasing number of patients are searching for a more holistic approach to healthcare [18]. After the initiation of conventional treatment the use of yoga, massage and acupuncture were reported to significantly increased in patients with PD to improve their health related problems [20].

PD is a serious condition with a major negative impact on patient's physical (postural instability [21], bradykinesia, rigidity [22], muscle tone, strength, flexibility, and motor control) [23], and mental (multiple mood disorders, such as anxiety, depression, and apathy) healths. In various studies, practice of yoga have shown to be effective in improving various physical functions such as stability [21], bradykinesia, rigidity, muscle strength, power [22], tremor reduction [24], Unified Parkinson Disease Rating Scale (UPDRS) motor scores [24,25], and the scores of Berg Balance Scale (BBS), Mini-Balance Evaluation Systems Test (Mini BES Test) [25], 30-Second Chair Stand, Single-Leg Balance test, right and left Sit and Reach Test [23], Timed Up and Go, 10-meter usual and maximal walking speed tests, 1 repetition maximum, and peak power for leg press [25]; physiological functions such as diastolic blood pressure and forced vital capacity [24]; mental function such as depression [23]; and QOL [24] in patients with PD.

In a case study, 12 week (one and half hour, twice weekly) practice of yoga with physical therapy exercise followed by 12 week of home exercise program has shown to be effective in improving Parkinson's Disease Questionnaire, High Level Mobility Assessment tool, length of several lower extremity muscles, strength of upper and lower extremity muscles, dynamic balance in a patient with PD. Moreover, patient was reported to continue to participate in work, leisure, and even in community activities. However, there were no improvements in thoracic posture or aerobic power [26]. In another case study, a 69 year old female with 8-year history of PD who underwent 8-week of yoga has showed clinically insignificant objective improvements in functional activities. However, subjectively the participant was reported to gained much enjoyment and relaxation from the yoga classes [27]. Moreover, among various types of mind-body exercises, yoga was reported to be the largest and to produce the most significant beneficial effect in reducing UPDRS III scores for people with mild to moderate PD [28].