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**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.805948>Available online at: <http://www.iajps.com>**Research Article****THE EFFICACY OF INTEGRATING TAI CHI AND MINDFULNESS
EXERCISES ON THE MS PATIENTS' IMPROVED BALANCE,
COORDINATION, AND PERFORMANCE**Shahla Hojjat^{1*}, Mehdi Kohandel², Hamid Isazadeh³¹Department of Physical Education and Sport Sciences, Islamic Azad University, Karaj Branch, Iran²Department of Physical Education and Sport Sciences, Islamic Azad University, Karaj Branch, Iran.³Master of Physical Education of Biomechanics, Islamic Azad University, Karaj branch, Iran**Abstract:**

The balance and postural control impairments are current problems in people with multiple sclerosis, so much that the risk of fracture from falls in MS patients is 2 to 3-times higher than for a healthy control. The aim of the current study was to determine the effectiveness of integrated Tai Chi and mindfulness on balance, coordination of movement, fatigue, quality of life, disability with multiple sclerosis patient. In a Quasi-experimental research dynamic and static balance and coordination of movement of 30 people with MS was measured by the Berg Balance Scale, Timed Up and Go Test and Minnesota Rate of Manipulation Test Minnesota Manual Dexterity Test, MRMT/MMDT. Also Fatigue Severity, quality of life, disability was assessed by Fatigue Severity Multiple Sclerosis quality of life questionnaire (MSQOL-54 scale) Expanded Disability Status Scale (EDSS) before and after the training program and follow up, after 30 days. Data were analyzed by multivariate analysis of covariance, MANCOVA. The results indicated that integrated Tai Chi and mindfulness significantly improvements for static balance ($P<0.001$), dynamic balance ($P<0.001$), coordination of movement ($P<0.001$).also, significantly reduction fatigue severity ($P<0.001$) and improvements in quality of life ($P<0.001$) and disability ($P<0.001$) in patients with multiple sclerosis. Generally the results of this study indicate that can in treatment patients with multiple sclerosis of Tai Chi and mindfulness alongside current treatments for medical use. Because the physical and psychological benefits for patients. Also in these patients due to their multiple needs of comprehensive programs to be used.

Key words: Thai Chi, Mindfulness, Balance, Coordination, Multiple Sclerosis Disease.**Corresponding author:****Shahla Hojjat,**Department of Physical Education and Sport Sciences,
Islamic Azad University,
Karaj Branch, Iran.E-mail: academicilam@gmail.com;

Tel: +989127926703

QR code



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INTRODUCTION

Multiple Sclerosis (MS) is one of the most common chronic disease of the central nervous system that is associated with severe demyelinating of the neurons; the various demyelinated organs resulting from the disease include the entire white matter and affect the sensory-motor function [1]. MS is a chronic and disabling in which the immunity responses damages the Myelin of the axons in the central nervous system i.e. brain and spinal cord [2]. Some of the most common physical early symptoms of this disease include motor-balance disorders, visual disorders, pain, urinary incontinence, and fainting. Besides these physical problems, destruction of nervous cells Myelin usually results in mental and psychological problems. The experts maintain that about 43 percent of patients suffering from MS suffer from minor mental and psychological problems as well. About 53 of MS patients suffer from moderate and severe problems; lack of mental and psychological control affect the incidence of disorders. The number of MS patients in Iran was estimated to be 30,000 by Iran MS society in 2003. Today, despite the significant developments, the diagnosis of the cause and the definite treatment method of this disease are still unknown; the factors behind its aggravation and remission are not definitely known as well [3]. The most common age for suffering from this disease is 20-40 [4]. Moreover, for most of the MS sufferer, walking with dizziness and motor control disorder are the primary symptoms of this disease, so that the patients generally find it difficult to direct their movement. Moreover, spasm and muscle cramp are other bothering motor symptoms in MS patients. These spasms are usually painful, and they tend to occur in the end parts of the body such as hands and feet and increase the motor problems of these patients [5]. In fact, these symptoms significantly affect the MS sufferers' function and quality of life [6]. Fatigue is the most common and most bothering symptom in these patients. A study conducted in the US indicated that 75-90 percent of the MS patients suffer from fatigue, and 50-60 percent of the patients reported that different aspects of their lives were disordered. Moreover, it has been also claimed that fatigue reduces quality of life and increases laziness in MS patients [7]. In another study conducted in Iran, the fatigue frequency was reported to be more than 28 times a month in 90 percent of the patients [8]. The physical sports have recently been introduced as the main part of the treatment of this disease [9]. In fact, there are evidences suggesting that doing sport is useful for their health by affecting their muscular power, aerobic capacity, movement, temper, fatigue, and quality of life [10, 11 and 12]. Moreover, sport

results in an improved immune system [13]; recent studies have suggested that continuous physical sport will result in an improved flexibility of brain and bring about positive effects on its mechanisms [14]. However, most of the MS patients are physically inactive, and they have little or no information about choosing specific sports programs and their effects [15]. Tai Chi is Chinese martial arts introducing a multiple intervention and address musculoskeletal power, flexibility, and mindfulness. This sport includes a series of peaceful and concentrated movements associated with deep breath. Doing Tai Chi has positive effects on the treatment of neurological diseases such as Parkinson's, fibromyalgia, brain stroke, and PNS disease [16, 17 and 18]. Mindfulness means paying attention to our present thoughts and feelings without judging them [19]. In fact the effects of mindfulness, results in developing new thoughts and reducing unpleasant emotions [20]. The present study aims at identifying the efficacy of Tai Chi and Mindfulness exercises on the MS patients' static and dynamic balance, motor coordination, fatigue severity, quality of life, and functional disability.

MATERIALS AND METHODS:

The statistical population of the present study includes all MS patients that referred to Karaj MS Society in the fall of 2015; they regularly participated in the sessions held by the Society. In the present study, 30 MS patients participated. Their ages range from 20 to 50; the youngest was 20, and the oldest was 50 years old. All of them were female, and they had spent equal an equal time since they were diagnosed with the disease. They did not have any other motor and physical disorder other than MS. The participants were placed in two 15-participant groups including the control group and the experimental group. The inclusion criteria of the present study were the clinical tests, specialist's examination, age range of 20-50, having high school diploma degree and higher, lack of using psychiatric drugs, having the EDSS score less than 6, and the ability to participate in the present training course. Moreover, the exclusion criteria of the present study were two absences in the intervention sessions, the incidence of severe and sudden neurological symptoms either before or after the course, and suffering from any other chronic disease. The participants' demographic information was collected using questionnaires. For measuring the balance in the aging population that was in the clinical status, Berg Balance Scale was used with the range of lowest and highest of 0 to 56 respectively. Moreover, for measuring the dynamic balance, TGUG test was applied that includes 6

stages. For evaluating the professional preparation, disabilities, and rehabilitation, MRMT/MMDT test was used. For identifying the intensity of fatigue in patients suffering from MS, FSS questionnaire was used. For evaluating the MS patients' quality of life, MSQOL 54 was used. The experimental group underwent twelve 1.5-2-hour weekly sessions of Tai Chi and Mindfulness training exercises. The participants were analyzed with respect to the improvement of the disease after one month. Data analysis was conducted using MANCOVA and ACOVA tests and SPSS 18 [21, 23].

FINDINGS:

The findings of the present study indicate that the mean age of the experimental group and control group were 33/43 and 24/44 years respectively. The

mean weight of the experimental group and control group were 45/73 and 54/70 kg respectively. Moreover the BMI of the experimental group was 26/56 kg/m², and the control group's BMI was 25/83 kg/m². The experimental group's fatigue intensity and functional disability were less than those of the control group were. The experimental group's quality of life was more than that of the control group was. Moreover, it was also made clear that doing Tai Chi and Mindfulness exercises will increase the MS patients' dynamic and static balance as well as motor coordination in the post-test and follow-up stages ($P < 0.05$)(Table 1). Furthermore, doing the abovementioned exercises will result in reduced fatigue and functional disability and increased quality of life in the post-test and follow-up stages ($P < 0.05$)(Table 2).

Table 1: The average score of static balance, dynamic balance, and motor coordination in the experimental group and control group.

Variable	Experimental group			Control group		
	Pre-test	Post-test	Follow-up	Pre-test	Post-test	Follow-up
Static Balance	4.16±1.11	5.61±49.11	5.46±48.89	4.99±42.94	4.02±41.33	4.01±41.06
Dynamic Balance	1.89±1	2.22±14.18	2.84±14.51	1.96±11.89	1.51±11.61	1.29±11.18
Motor Coordination	2.88±1	1.22±10.18	1.84±10.51	3.26±17.89	3.01±17.61	3.29±17.18

Table 2: The mean scores of fatigue intensity, quality of life, and functional disability in experimental group and control group.

	Experimental Group			Control Group		
	Pre-test	Post-test	Follow-up	Pre-test	Post-test	Follow-up
Fatigue Intensity	3.11±5	1.07±3.05	1.27±3.88	3.89±5.	3.09±5.16	3.96±5.65
Quality of Life	2.72±62.77	14.92±71.3	14.37±70.22	11.42±59.33	11.78±5	11.64±59.63
Functional Disability	2.02±4.44	1.49±3.3	1.23±3.09	2.51±4.47	2.01±4.17	2.55±4.76

DISCUSSION:

The initiation of MS generally brings about primary or comprehensive reduction of physical, social, and cognitive functions will bring about destructive effects on the quality of life of the patients, their families, and their friends and relatives [24]. The most important problems of MS patients, being their primary symptoms, are the incidence of motor disorders and their disability in maintain balance and motor coordination. Lack of mental relaxation and self-control can affect the incidence or aggravation of these disorders, and they will bring about negative effects on MS patients' fatigue intensity, quality of life, and functional ability, so that the life expectancy is 5-10 years less than others are. Given that the positive effects of Tai Chi have been confirmed for patients suffering from neurological problems, the present research aimed at studying the efficacy of integrating Tai Chi and Mindfulness exercises on the MS patients' improved balance, coordination, and performance. The findings of the present study indicate that Tai Chi and Mindfulness exercises can affect the MS patients' increased static balance; this is consistent with the findings of the studies conducted by Timothy, Schaller, Husted and Mills [25-29]. Moreover, in the study conducted by Hosseini-sisi et al, 2012, conducted to study eight weeks of Rebound-Therapy and Pilates exercises on the female patients' static and dynamic balance, the findings suggested the positive effects of these methods on the improvement of symptoms in MS patients; this is consistent with the findings of the present study as well [30]. In the study conducted by Everard et al, 2004, conducted to study the balance changes as well as Vestibular responses in female MS patients through using Tai Chi exercises, the findings indicated that dynamic balance was improved significantly after Tai Chi exercises, and lowered systolic and diastolic blood pressure was observed as well [31]. In the study conducted by Tavee et al, 2011, conducted to study the effects of Tai Chi exercises on the MS patients' mental and psychological health as well as pain relief, the findings indicated that no significant improvement was observed in these patients [32]. Given the findings of the present study, it seems that Tai Chi and Mindfulness balance exercises have significant effects on the improved balance of these individuals through increasing their ability to transfer the weight control and the simultaneous movement gravity center and support surface. In the study conducted by Cheng et al, 2008, the studied the effect of Tai Chi motor control on the hand-eye coordination in the elderly. The participants of the aforementioned studied did Tai Chi exercises on a regular basis for more than 3 years; the findings of this study indicated

that by doing Tai Chi exercises, the elderly showed better results in hand-eye coordination tests than the elderly of the control group [33]. Furthermore in the study conducted by Grossman et al, 2010, the findings of a clinical trial indicated that doing mindfulness and yoga exercises once a week for 8 weeks will result in reduced fatigue, anxiety, and depression, they will also bring about MS patients' improved quality of life [34]. In another study conducted on MS patients, it has been claimed that doing meditation exercises will bring about MS patients' relieved pain, reduced cognitive and psycho-social aspects of fatigue, and increased quality of life [32]. In explaining this hypothesis, it can be said that doing meditation exercises, especially Mindfulness and Tai Chi, will result in MS patients' reduced fatigue intensity through increasing musculoskeletal power and improving mental health and flexibility. Tai Chi exercises will also reduce cortisol resulting in reduced fatigue intensity [35]. In the study conducted by Shater-Yazdi et al 2006, randomly conducted on 45 healthy girls aging 20-25 at Ahvaz University of Medical Sciences, the findings indicated that physical exercises will bring about the most significant improvement of hand-eye coordination ($P<0.05$); as for the mental exercises group, significant improvement was observed in the hand-eye coordination ($P<0.05$). However, this improvement was less than that of physical group [36]. This is consistent with the findings of the present study.

CONCLUSION:

The findings of the present study indicated that body-mind comprehensive medical approaches such as Tai Chi and Mindfulness should be included in the therapeutic programs of MS patients. These approaches will bring about multilateral effects and will have desirable effects on the individuals' physical and mental structures. It is recommended that further studies be conducted on the effect of other variables on the balance and motor problems, so that more comprehensive explanations are provided.

REFERENCES:

1. Peterson C, Cabe PM. Mood and self-esteem of persons with multiple sclerosis following an exacerbation. *J Psychosom Res* 2005; 59(5):161-66 .
2. Noseworthy J, Lucchinetti C, Rodrigues M , Weinschenker BG. Multiple sclerosis. *N Engl J Med* 2000; 343(13): 938-52.
3. Ahmadnia SH. Work and women's health . *J Farhang and Pajhoohesh* 2006; 196(3): 45-56.
4. Currie R. Spasticity a common symptom of multiple sclerosis. *J nurs stand* 2004; 15(33): 47-52.

5. Kenner M, Menon U, Elliott DG. Multiple sclerosis as a painful disease. *Int Rev Neurobiol.* 2007; 79(6): 303-21.
6. Wayne PM, Krebs DE, Wolf SL, Gill-Body KM, Scarborough DM, McGibbon CA, Kaptchuk TJ, Parker SW. Can Tai Chi improve vestibulopathic postural control? *Archives of physical medicine and rehabilitation* 2004; 85(1):142-52.
7. Wayne PM, Kaptchuk TJ. Challenges inherent to t'ai chi research: part I—t'ai chi as a complex multicomponent intervention. *The Journal of Alternative and Complementary Medicine* 2008; 14(1):95-102.
8. Raisi H. The effect of education on how to care and incidence of complications in patients with multiple sclerosis, neurological clinics visiting the city of Shiraz, 1998. Nursing graduate thesis, Iran University of Medical Sciences, 1998.
9. Latimer-Cheung AE, Ginis KA, Hicks AL, Motl RW, Pilutti LA, Duggan M, Wheeler G, Persad R, Smith KM. Development of evidence-informed physical activity guidelines for adults with multiple sclerosis. *Archives of physical medicine and rehabilitation* 2013; 94(9):1829-36.
10. Döring A, Pfueller CF, Paul F, Dörr J. Exercise in multiple sclerosis--an integral component of disease management. *EPMA Journal* 2011; 3(1): 2-8.
11. Rietberg M, Brooks D, Uitdehaag B, Kwakkel G. Exercise therapy for multiple sclerosis. *Cochrane Database Syst Rev* 2005; CD003980.
12. Ellis T, Motl RW. Physical activity behavior change in persons with neurologic disorders: overview and examples from Parkinson disease and multiple sclerosis. *Journal of Neurologic Physical Therapy* 2013; 37(2): 85-90.
13. Dalgas U, Stenager E. Exercise and disease progression in multiple sclerosis: can exercise slowly down the progression of multiple sclerosis? *Therapeutic advances in neurological disorders* 2012; 5(2): 81-95.
14. Knaepen K, Goekint M, Heyman EM, Meeusen R. Neuroplasticity—exercise-induced response of peripheral brain-derived neurotrophic factor. *Sports medicine* 2010; 40(9): 765-801.
15. Sá MJ. Exercise therapy and multiple sclerosis: a systematic review. *Journal of neurology* 2014; 261(9): 1651-61.
16. Wayne PM, Kaptchuk TJ. Challenges inherent to t'ai chi research: part I—t'ai chi as a complex multicomponent intervention. *The Journal of Alternative and Complementary Medicine* 2008; 14(1): 95-102.
17. Burschka J, Kuhn P, Menge U, Oschmann P. Research on Tai Chi as a sport in health care. *Sportwissenschaft* 2013; 43(3): 181-96.
18. Li F, Harmer P, Fitzgerald K, Eckstrom E, Stock R, Galver J, Maddalozzo G, Batya SS. Tai chi and postural stability in patients with Parkinson's disease. *New England Journal of Medicine* 2012; 366(6): 511-19.
19. Husted C, Pham L, Hekking A, Niederman R. Improving quality of life for people with chronic conditions: The example to t'ai chi and multiple sclerosis. *Alternative therapies in health and medicine* 1999; 5(5): 70-4.
20. Wong AM, Pei YC, Lan C, Huang SC, Lin YC, Chou SW. Is Tai Chi Chuan effective in improving lower limb response time to prevent backward falls in the elderly? *Age* 2009; 31(2): 163-69.
21. Havasian MR, Panahi J, Pakzad I, Davoudian A, Jalilian A, Zamanian Azodi M. Study of Inhibitory effect of alcoholic and aqueous extract of *Scrophularia striata* (tashne dari) on candida albicans in vitro. *J of Pejouhesh* 2013; 36(5): 19-23.
22. Havasian MR, Panahi J, Khosravi A. Correlation between the lipid and cytokine profiles in patients with coronary heart disease (CHD)(Review article). *Life Science Journal* 2012; 9(4): 5772-77.
23. Panahi J, Havasiyan MR, Gheitasi S, Pakzad I, Jalilijan A, Hoshmandfar R, Havasiyan M. The in Vitro Inhibitory Effects of the Aqueous Extracts of Summer Onion on *Candida Albicans*. *J of Ilam Uni Med Sci* 2013; 21(1): 54-9.
24. Jopson NM, Moss-Morris R. The role of illness severity and illness representations in adjusting to multiple sclerosis. *Journal of psychosomatic research* 2003; 54(6): 503-11.
25. Hain TC, Fuller L, Weil L, Kotsias J. Effects of T'ai Chi on balance. *Archives of Otolaryngology–Head & Neck Surgery* 1999; 125(11): 1191-95.
26. Timothy C. Hain, MD, TAI CHI for balance study, Rehabilitation Institute of Chicago, 1994.
27. Schaller KJ. Tai Chi Chih: an exercise option for older adults. *Journal of gerontological nursing* 1996; 22(10): 12-7.
28. Mills N, Allen J. Mindfulness of movement as a coping strategy in multiple sclerosis: a pilot study. *General hospital psychiatry* 2000; 22(6): 425-31.
29. Mills N, Allen J, Carey-Morgan S. Does Tai Chi/Qi Gong help patients with multiple sclerosis? *Journal of Bodywork and Movement Therapies* 2000; 4(1): 39-48.
30. Hosseini-sisi M. The rebound effect of eight weeks of therapy and Pilates on static and dynamic balance in patients with multiple sclerosis. Master's Thesis, Islamic Azad University, 2012.
31. Thornton EW, Sykes KS, Tang WK. Health benefits of Tai Chi exercise: improved balance and blood pressure in middle-aged women. *Health Promotion International* 2004; 19(1):33-8.

32. Tavee J, Rensel M, Planchon SM, Butler RS, Stone L. Effects of meditation on pain and quality of life in multiple sclerosis and peripheral neuropathy: A pilot study. *International journal of MS care* 2011; 13(4):163-8.

33. Chang Y, Yang Y, Chen C, Chiang B. Tai Chi Chuan training improves the pulmonary function of asthmatic children. *J of Micro Immu and Infe* 2008; 41(1):88-95.

34. Grossman P, Kappos L, Gensicke H, D'Souza M, Mohr DC, Penner IK, Steiner C. MS quality of life,

depression, and fatigue improve after mindfulness training a randomized trial. *Neurology* 2010; 75(13): 1141-49.

35. Putai Jin. Changes in heart rate, noradrenaline, cortisol and mood during Tai, *Journal of Psychosomatic Research* 1989; 33(2): 197-206.

36. Shter-Yazdi MJ, Shah-Ali SH, Arian R, Salehi R. The effect of mental practice on eye-hand coordination in girls between 25-20 years of rehabilitation. *Tavanbakhshi* 2006; 7(3): 12-8.