

Tai Chi Therapy Attenuates Biophysiological Status, Pain and Depression in Elderly Subjects

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ABSTRACT

BACKGROUND

Tai chi has been widely practiced as a form of art, religious sacrament, a unique technique to relax, work out, and as a method of self-defence for people of all ages. Elderly people and people with chronic illness are more benefited with Tai chi, because of its low intensity, steady rhythm, and low physical and mental tension. This study is planned to determine the effectiveness of Tai chi therapy on biophysiological status and depression among the elderly subjects.

METHODS

The study was conducted in 150 elderly volunteers of whom 75 were selected for study group and 75 for control group. The 10 forms of Tai chi therapy were demonstrated by the researcher and the same was followed by the participants under supervision. The therapy was performed as one hour session two times in a week for totally twelve weeks under the proper supervision of the researcher. Tai chi therapy was performed following this, by the participants without the supervision of the researcher for 24 weeks as one-hour session twice a week. The total duration of the therapy was 60 minutes which included warm up exercise for 10 minutes, Tai chi therapy 45 minutes and cool down for 5 minutes. The control group received routine care given by the personnel in the old age home. Depression and biophysiological status such as BP, pain and depression were assessed using the questionnaire in both groups at the end of 12th, 24th and 36th weeks.

RESULTS

The induction of Tai chi showed significant difference in systolic blood pressure in elderly who practiced Tai chi therapy. The independent t test value was found to be as follows-pre-test: 1.837 (p = 0.068), post-test I: 2.858 (p = 0.005), post-test II: 3.723 (p = 0.000) and post-test III: 3.737 (p = 0.000). In pain evaluation it was noted that t-test for pre-test : 1.712 (p = 0.089), post-test I: 2.514 (p = 0.13), post-test II: 3.836 (p = 0.000) and post-test III: 4.502 (p = 0.000). Thus, it is evident that Tai chi therapy was useful in managing pain. In view of depression, it was noted that Tai chi therapy was also little effective as seen by the t test values, pre-test: 0.441 (p = 0.660), post-test I: 1.458 (p = 0.147), post-test II: 1.693 (p = 0.032) and post-test III: 2.787 (p = 0.006).

CONCLUSIONS

It was evident that Tai chi therapy is very effective in elderly people. There were significant changes in biophysiological status, depression and pain in the elderly who received Tai chi therapy.

KEY WORDS

Elderly, Pain, Depression, Tai Chi Therapy

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BACKGROUND

The life expectancy of older people continues to rise in India. Majority of the world's population consist of people of age above 60 years as most people are expected to live beyond this, and thus population is increasing day by day and it is expected now, that this will be around 5 billion.¹ People are not healthier now when compared to olden days though they live longer than before. The concern for today is that whether the additional years living beyond will comprise good number of years of healthy life and promote a high health-related quality of life into old age. Healthy life is supported with physical activity, which encompasses sports and ground exercise which is performed as part of daily activity, occupation, leisure, or active transportation.² It is a protective factor for non-communicable diseases such as cardiovascular disease, stroke, diabetes, and it is also associated with improved mental health, delay in the onset of dementia and improved quality of life and wellbeing.³ As a result of the aging process, elders typically experience declining physical functioning and increasing incidence of chronic health problems, which often affect their sense of well-being and lower their quality of life and self-satisfaction. Although some declines with age are inevitable, research indicates that physically active older adults maintain healthy functioning as a normal process.⁴ Lot of research is going on to understand the benefit of exercise and its outcome under various disciplines. The beneficial effects of exercise on an elder's well-being, both physical and psychologic, have been already reported.⁵

Tai chi has been widely practiced as a form of art, religious sacrament, an unique technique to relax, stress buster, rejuvenate, work out, and method of self-defence for people of all ages.⁶ It includes a flow of liquid in body, consistent, elegant, move like developments that are incorporated by mind fixation, balance, moving of body weight, muscle unwinding, and breathing control.⁷ As it doesn't put much stress on muscles and joints it is considered to be safe for people of all ages. Individuals of a similar biological age may exhibit a wide variance in their responses to exercise because of varying aging processes.⁸ The need for Tai-Chi exercise should be personalized with regard to the intensity and difficulty, and exercise levels should gradually progress based on the functional ability of the individuals who can perform the exercise.⁹ It is also reported that Tai chi exercise may provide psychological benefits, such as enhanced positive mood states and reduced nightmares.

Tai chi is more effective for elder people who have suffered a stroke, heart attack or other ailment, the benefits can greatly enhance quality of life. It reduces stress, increases oxygen flow, enhances mental capacity and concentration, reduces blood pressure, alleviates pain and improves posture balance.¹⁰ Studies reported that when a person practices Tai chi with full mind concentration, enhanced and peaceful breathing in every movement, the person will experience relaxation in mind thus leading to many additional benefits to the body.¹¹ In general, Tai chi has been shown to produce stability, fall prevention, cardiovascular and ventilatory enhancement, health-related fitness improvement, rheumatoid arthritis rehabilitation, and pain, stress, and nightmare reduction. Researchers also found that Tai chi practitioners had better physical and mental health status, lower systolic and diastolic blood pressure, fewer falls within a year, less mood disturbance, and better

mood status when compared with people who didn't practice the exercise.¹² Tai chi can be incorporated into community programs or senior centre activities to promote the wellbeing of community-dwelling elders. It also could be included as an activity in nursing homes, community centres and rehabilitation programs in hospital settings.¹³

In India, though a lot of natural therapies are available and practiced by many, Tai chi is not greatly practiced. There is a great need for this therapy to be followed for the elderly people as this therapy showed a lot of potential benefits. Thus, this study is planned to determine the effectiveness of Tai chi therapy on biophysiological status and depression among the residing elderly subjects.

METHODS

A quantitative quasi experimental research with evaluative approach was used and the study was approved by the institutional ethics committee of Sri Ramachandra University, Chennai. The study was conducted from January 2013 to July 2014 and each elderly participated in the study for a duration of nine months period. It was conducted to evaluate the effectiveness of Tai chi therapy, in relation to biophysiological status and depression among the elderly. The sample size was 68 in each group with a total of 136 to achieve 80 % power at a 5 % level of significance. Considering 10 % of attrition the total was rounded to 150 of whom 75 elderly were selected for study group and 75 for control group by random sampling method. Inclusion criteria were males and females from old age home, aged between 60 – 80 yrs., willing to participate, able to understand Tamil and English, able to walk, stand, move both upper and lower limbs without support. Participants with psychiatric, systemic illness, loss of vision, hearing issues, stay of less than 3 months at old age home and who had undergone surgeries were excluded. After proper permissions, 32 old age homes were contacted, 8 homes gave permission to assess, in which 2 homes had only female residents and one home was government run home. Due to difficulties in comparison these 3 homes were excluded and 5 homes were selected. From the remaining 5, two homes with maximum number of inmates which were comparable in terms of number of residents, both sexes, facilities like food, recreation and health care provided free of cost were selected to meet the sample size. Out of 2 homes one home was allotted as study group and one home as control group by simple randomisation. Upon providing adequate information, informed consent was obtained from all participants. The study was conducted from January 2013 to July 2014 and each elderly participated in the study for a duration of nine months period. Pre-test assessment was done for all the participants in both study and control group. It includes information of background variables like demographic, personal and clinical data. Depression was assessed using Geriatric Depression Scale. The data was collected in the form of questionnaire. Tai chi therapy was taught to all participants in the study group, 25 in each group. The 10 forms of Tai chi therapy (Starting form, Grasp peacock's tail, single whip, white crane spreads its wings, raise hands and push up, left knee brush, right knee brush, apparent close up, crossed hand and finishing form) was demonstrated by the researcher and the same was followed by the participants under supervision. The therapy

was performed as one hour session twice a week for 12 weeks under the supervision of the researcher. Following this the Tai chi therapy was performed by the participants without the supervision of the researcher for 24 weeks as one-hour session twice a week. The researcher visited the old age home once a week and provided reinforcement to the participants. The total duration of the therapy was 60 minutes which constitutes warm up exercise for 10 minutes, Tai chi therapy 45 minutes and cool down for 5 minutes. The control group received routine care given by the personnel in the old age home. Depression and bio physiological status such as BP and pain were assessed using the questionnaire in both groups at the end of 12th, 24th and 36th weeks. Post-test I was for the participants in the study and control group at the end of 12 weeks, post-test II is at 24 weeks and post-test III is for 36 weeks. The questionnaire used was the same all through the post-tests. The investigator ensured confidentiality of all the participants.

Ethical Considerations

An approval to conduct study was obtained from the institutional ethical committee, Sri Ramachandra University.

Statistical Analysis

Data was analysed using the SPSS for windows (version 17) and p value of < .05 was considered significant. To compare the observations within the group paired ‘t’ test was used. To compare the relationship between the groups independent ‘t’ test was used.

RESULTS

Level of Systolic Blood Pressure	Pretest (n = 75)		Posttest I (n = 74)		Posttest II (n = 72)		Posttest III (n = 70)	
	No	%	No.	%	No.	%	No.	%
Normal < 130 mm of Hg	20	26.7	24	32.4	26	36.2	26	37.1
Pre Hypertension 130 - 139 mm of Hg	16	21.3	16	21.6	15	20.8	20	28.6
Stage 1 (Mild) 140 - 159 mm of Hg	28	37.3	25	33.8	25	34.7	20	28.6
Stage 2 (Moderate) 160 - 179 mm of Hg	10	13.3	08	10.8	06	8.3	04	5.7
Stage 3 (Severe) > 180 mm of Hg	01	1.4	01	1.4	00	-	00	-

Table 1. Frequency and Percentage Distribution of Systolic Blood Pressure during Pre-Test, Post-Tests I, II and III among Elderly in the Study Group (n = 75)

Duration of the Study	Study Group Mean	Study Group SD	Control Group Mean	Control Group SD	Mean Difference	Independent t & p Value
Pretest ^{a,b}	149.84	18.142	150.81	19.329	- 0.97	1.837 .068 NS
Posttest I ^{c,d}	147.59	17.114	149.71	19.595	- 2.12	2.858 .005**
Posttest II ^{e,f}	143.44	16.425	149.34	20.048	- 5.9	3.723 .000***
Posttest III ^{g,h}	141.77	16.780	148.67	19.531	- 6.9	3.737 .000***

Table 2. Comparison of Pre-Test, Post-Test I, Post-Test II and Post-Test III Mean Score of Systolic Blood Pressure among Elderly between the Study and the Control Groups (N = 150)

NS- Non-Significant, ***p < .001 **p < .01, ^a n = 75, ^c n = 74, ^e n = 72, ^g n = 70 for the study group, ^b n = 75, ^d n = 75, ^f n = 71, ^h n = 69 for the control group.

Table 1 projects the distribution of systolic blood pressure among the elderly in the study group. During pre-test 20 (26.7 %) elderly had normal systolic blood pressure which has been improved to 26 (37.1 %) in the post-test III and 28 (37.3 %) had mild systolic hypertension during pre-test which has been reduced to 20 (28.6 %) in the post-test III.

Table 2 represents level of systolic blood pressure among elderly between the study and control groups. During the pre-test, post-test I, II and III it was noted that there was no difference between the groups. The total number of attrition of elderly in this study was 11. Two elderly in the study group and four elderly in the control group left the old age home, one elderly in the study group and two in the control group died and 2 elderly in the study group became sick, during the period of study.

Duration of Study	Study Group Mean	Study Group SD	Control Group Mean	Control Group SD	Mean Difference	Independent t & p Value
Pretest ^{a,b}	88.45	10.065	87.67	11.321	0.78	0.989 .324 NS
Posttest I ^{c,d}	86.22	10.319	88.43	11.867	-2.21	1.176 .242 NS
Posttest II ^{e,f}	85.86	9.526	88.61	12.010	-2.75	0.065 .972 NS
Posttest III ^{g,h}	85.44	10.123	88.72	11.620	-3.28	0.021 .032*

Table 3. Comparison of Pre-Test, Post-Test I, Post-Test II and Post-Test III Mean Score of Diastolic Blood Pressure among Elderly between the Study and the Control Groups (N = 150)

NS- Non significant, *p < .05^a n = 75, ^c n = 74, ^e n = 72, ^g n = 70 for the study group, ^b n = 75, ^d n = 75, ^f n = 71, ^h n = 69 for the control group.

Table 3 highlighted the mean difference between the diastolic blood pressure among the study and the control groups during the pretest and posttests. It was identified that during pre-test, post-test I and post-test II there was no significant mean difference between the study and control groups. At post-test III, a statistically significant mean difference was identified between the study and the control groups at p < .05 level of significance.

Duration of Study	Study Group Mean	Study Group SD	Control Group Mean	Control Group SD	Mean Difference	Independent t & p Value
Pretest ^{a,b}	4.25	1.685	4.01	2.193	0.24	1.712 .089 NS
Posttest I ^{c,d}	3.97	1.688	3.83	2.166	0.14	2.514 .013*
Posttest II ^{e,f}	3.21	1.661	3.22	2.112	-0.01	3.836 .003**
Posttest III ^{g,h}	2.47	1.726	3.57	2.074	-1.10	4.502 .000***

Table 4. Comparison of Pre-Test, Post-Test I, Post-Test II and Post-Test III Mean Score of Pain among Elderly between the Study and the Control Groups (N = 150)

NS - Non significant, *p < .05, **p < .01, ***p < .001 ^a n = 75, ^c n = 74, ^e n = 72, ^g n = 70 for the study group, ^b n = 75, ^d n = 75, ^f n = 71, ^h n = 69 for the control group.

Table 4 compares the mean and standard deviation of the pain scores between the study and the control groups during pre-test and post-tests I, II & III. A statistically significant difference in the mean scores was identified during the post-test I at p < .05, post-test II at p < .01 and post-test III at p < .001 between the study and the control groups. Table 5 compares the mean and standard deviation of the depression scores between the study and the control groups during pre-test and post-tests I, II & III. A statistically significant difference in the mean score was identified during the post-test II at p <

.05 and post-test III at $p < .01$ between the study and the control groups.

Duration of Study	Study Group Mean	Study Group SD	Control Group Mean	Control Group SD	Mean Difference	Independent t & p Value
Pretest ^{ab}	16.52	2.910	15.72	2.633	0.80	0.441 .660 NS
Posttest I ^{cd}	15.19	3.051	15.85	2.486	-0.66	1.458 .147 NS
Posttest II ^{ef}	14.06	3.103	14.87	2.651	-0.81	1.693 .032*
Posttest III ^{gh}	12.74	3.238	15.17	2.797	-2.43	2.787 .006**

Table 5. Comparison of Pre-Test, Post-Test I, Post-Test II and Post-Test III Mean Score of Depression among Elderly between the Study and the Control Groups (N = 150)

NS - Non-Significant, * $p < .05$; ** $p < .01$ ^a n = 75, ^c n = 74, ^e n = 72, ^g n = 70 for the study group, ^b n = 75, ^d n = 75, ^f n = 71, ^h n = 69 for the control group.

DISCUSSION

Tai chi aims to strengthen, stretch, balance, and coordinate and integrate the left and right halves of the body, the upper and lower halves of the body, and the extremities of the body with the inside or core.¹⁴ The body movements in Tai chi are coordinated with rhythmic, conscious breathing and multiple cognitive and emotional components-including visualization, focused attention, imagery, heightened self-awareness, and intention.¹⁵

The present study is conducted first, to evaluate the impact of Tai chi influence of bio physiological status, depression and quality of life in elderly subjects. Lifestyle modifications such as regular exercise and a healthy diet are other factors that have been shown to bring positive changes during the aging process. Various studies have associated exercise with improved health in older adults, but most studies have focused on vigorous, high-intensity exercise.¹⁶

It has been reported that medium intensity aerobic exercise yields promising outcomes in the process of prevention and recuperation among elderly patients. Tai chi exercise involves a slow movement of the body structure and joints.¹⁷ Previous studies have shown that long-term Tai chi practice shows some encouraging effects by controlling the balance, cardiovascular fitness, flexibility, and reduced risk of falls in elderly patients.¹⁸ In another study it was noted that Tai chi benefited high blood pressure in elderly patients. It was noted in our study that Tai chi therapy benefited patients with high blood pressure.¹⁹ On induction of Tai chi therapy to the elderly people, a significant improvement is seen in the frequency and percentage distribution of the systolic blood pressure.²⁰

The mechanism of change in blood pressure maybe contributed to loss of sodium in perspiration during exercise where sodium losses may exceed normal dietary intake. In addition, the decreased tonic sympathetic nerve activity produced by exercise training can be considered as one of the mechanisms involved in the attenuation of hypertension which is very evident in our study. The reductions on sympathetic drive that follow training are more pronounced in patients with essential hypertension than in normotensive individuals and are likely to underline the antihypertensive effect of exercise.²¹ There are other proposed mechanisms accounting for the antihypertensive effects of exercise

training; the decrease of plasma norepinephrine, decrease of endogenous ouabain-like substance, increase of prostaglandin E, or decrease of plasma renin activity were also proposed to play a role.²²

In one study, the effect of Tai chi was studied on the depressive symptoms of patients. It was noted that three months of Tai chi intervention can significantly reduce scores on the Center for Epidemiological Studies Depression Scale.²³ In another study selective serotonin reuptake inhibitor (SSRI)(escitalopram) treatment supplemented with Tai chi, the subjects were more likely to experience a greater improvement in depressive symptoms and achieve depression remission.²⁴ These findings suggest that supplementing pharmacologic treatment with Tai chi may yield greater clinical improvement for individuals with geriatric depression. Studies have shown that depression is linked to structural and functional abnormalities in brain regions that are associated with emotion processing, self-representation, reward, and external stimulus interactions. Studies also suggest that core components of mind-body interventions such as Tai chimay include attentional control emotion regulation, and self-awareness.²⁵ In our study it was noted that depression scores drastically improved after Tai chi intervention which is evident as mentioned in clinical trials.²⁶ Severe depression among old age group was found more in affluent areas and old age homes. Thus, the intervention of Tai chi is a boon to such old people which will influence their life for their good and wellbeing.

CONCLUSIONS

The elderly residing at old age homes have significant changes in the biophysiological status. Tai chi therapy offers a safe, non-pharmacological approach to enhance the well-being among elderly. Elderly who received Tai chi therapy had significant reduction in their biological status such as systolic blood pressure and diastolic blood pressure. Highly significant reductions in the pain and depression scores were observed among the elderly who received Tai chi therapy. Thus, Tai chi therapy is an effective therapy in maintaining the physical and psychological wellbeing of the elderly.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: None.

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