

Effectiveness of Tai Chi Exercise Program on Sleep, Quality of Life, and Physical Performance in Postmenopausal Working Women

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ABSTRACT

Background: Menopause being an unavoidable time in every woman's life brings up various challenges. Inevitable changes in body systems affect the life of a woman permanently. The symptoms constitute the postmenopausal syndrome which further affects the quality of life (QOL). Women spend most of the time working during the menopausal transition period and also during postmenopause. The discussion of symptoms is still considered a taboo. Exercise intervention to reduce the symptoms related to menopause which can show a positive impact on health status and work needs to be incorporated. **Methodology:** Tai Chi exercise intervention was given for 8 weeks to the women who achieved natural menopause and were included in the study ($n = 76$). They were assessed for sleep, QOL, and physical performance before and after the intervention. **Results:** A significant difference was observed in all the outcomes after 8 weeks of intervention (Sleep Quality Scale (SQS)- $t = 7.57$, $P = 0.0001$; WHOQOL-BREF- $t = 7.56$, $P = 0.0001$; and Physical Performance Test PPT- $t = 19.93$, $P = 0.0001$). The results were consistent due to the active participation and high adherence rate of the individuals to the protocol. **Conclusion:** Our study revealed that besides being low velocity and low impact exercise, Tai Chi was a safe and effective mode of treatment in postmenopausal working women. In this group approach sessions were interactive and improved socialization skills because it was conducted in a community setting minimum equipment's and greater feasibility. Hence, this could also be incorporated in different age group population.

KEYWORDS: Menopause, physical performance, quality of life, sleep, Tai Chi exercise

INTRODUCTION

Menopause means permanent cessation of menstruation at the end of reproductive life due to loss of ovarian follicular activity.^[1] The average age of menopause of an Indian woman is 46.2 years.^[2] This phase of age is working phase in every woman's life taking them in the direction of aging. Since it is difficult to distinguish between symptoms resulting from aging or socio-environmental strain, symptoms found related to postmenopausal syndrome were irritability, mood swings, insomnia, difficulty in concentrating, mental confusion, headache, etc., Vasomotor changes, musculoskeletal symptoms, and depression are the most common symptoms in postmenopausal

women.^[3] Postmenopausal women are one of the most ignored groups of society, and it becomes vital in the scientific community to investigate the various aspects of this period and their effect on woman's health and quality of life (QOL).^[4] With advancing age, a natural decline of physiological functions, including loss of bone mass, muscle mass, and strength, is also noted. This has a significant impact on the physical performance.^[5] The reason behind the decline is due to

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deficiency of sex hormones showing an indirect effect.^[6] A considerable number of women also experience sleep difficulties in approach to menopause and beyond, with around 26% of women experiencing severe symptoms that influence daytime functioning.^[7] Growing attention is being given to the matter of menopause and work.^[8] There are a growing number of employed women aged 50 years and over, where the most common symptoms of menopause can influence work productivity and QOL.^[9] Discussion about the menopause at working place is widely perceived as taboo, and there has been little consideration of what employers could do to provide sufficient support during this period.^[10] The symptoms include poor concentration, tiredness, poor memory, feeling depressed, and many which have damaging influence on their working life.^[11-13] Providing better QOL is the main goal of health care and a significant factor for individual health in community.^[14] Physical activity has beneficial effects on overall health, and it is used as a treatment strategy in alleviating menopausal symptoms.^[15] Tai Chi is a form of physical activity which is an internal Chinese martial art practiced for both its defence training and its health benefits.^[16] It is also a cognitive-motor exercise or mind-body exercise which could be the most beneficial type of physical exercise to preserve or improve neurocognition in older individuals because they combine motor (physical) and cognitive demands which are required during work. Tai Chi exercise can improve cardiopulmonary functioning and increase flexibility and muscle strength. It is known for its beneficial effects on blood pressure when combined with different forms of lifestyle modifications.^[17,18] This exercise is a unique form of physical activity that promotes posture, flexibility, relaxation, wellness, and even mental concentration. Scholars have presented its neurocognitive benefits with major attention from understanding the neurobiological mechanisms and processes underlying the cognitive improvements in different age groups.^[18] Nowadays, more and more people turn to Tai Chi exercise for its potential health benefits, apparent safety, low cost, and also growing popularity. However, very limited studies had explored the impact of such exercise on postmenopausal symptoms in a population of working women. Therefore, the aim of the study was to evaluate the effectiveness of Tai Chi on sleep, QOL, and physical performance in postmenopausal working women.

METHODOLOGY

An experimental study consisted of 76 participants recruited from tertiary care hospitals, who were working as medical or paramedical staff. The study was approved by the ethics committee for research

on human subjects (MGM-ECRHS/2020/20) and registered (CTRI/2021/12/038591), and a written consent form was taken from all the participants. Females around the age group between 41 and 58 years with 12 consecutive months of amenorrhea were included in the study. Females with confirmed diagnosis of insomnia, any recent or major surgeries, and surgical menopause were excluded. The participants underwent Tai Chi exercise training according to the Peter and Mark.^[19] exercise program for 8 weeks with each session lasting for 60 min, and three sessions per week were administered under supervision. The participants were assessed before and after Tai Chi training.

Assessment

The sleep was assessed using the Sleep Quality Scale.^[20] This scale is composed of 28 items and 6 factors, including daytime dysfunction, restoration after sleep, difficulty in falling asleep, difficulty in getting up, satisfaction with sleep, and difficulty in maintaining sleep. The scale has been validated in individuals aged 18–59 years, requiring around 5–10 min for administration. The scale is a simple self-reported measure. The QOL was measured using the WHOQOL-BREF scale which contains a total of 26 questions. It is been provided in 19 different languages, and the scale was used in English for the study participants. It is a self-administered tool but can also be administered interviewer assisted. The major four domains are physical health, psychological health, social relationships, and environment. The physical performance of the subjects was assessed by Physical Performance Test^[21] which is a 7-item scale. There is a 5-point ordinal scale (0–4); most of the items are timed and then the value is converted into an ordinal score. A cutoff score of 15 has been used to predict falls with the PPT-7 version. “Frailty” is classified according to the score, i.e., 32–36 – not frail, 25–32 – mild frailty, 17–24 – moderate frailty, and below 17-unlikely to be able to function in the community.

Intervention

All the participants with menopause who were employed in a tertiary care hospital were selected as per the inclusion and exclusion criteria. The participants were requested to take part in the study, they were briefed about the study, and a written consent form was obtained. They were assessed for QOL, physical performance, and sleep before the Tai Chi program was incorporated. After the outcome measures were taken accordingly, the participants received a physical Tai Chi exercise program for 8-week period. The exercise was incorporated in group by an experienced physical therapist who is expertized in Tai Chi. The exercises included were Tai Chi pouring, swinging, drumming, standing, swinging

to connect the kidneys and lungs, hip circles, spiraling the lower extremities and upper extremities, spinal cord breathing, fountain, washing yourself with QI from the heavens, raising the power and cool down exercise for the first 2 weeks. The same were continued with addition of push and withdraw, wave hands like clouds for the next 3 weeks and for the last 3 weeks the same set of exercise with addition of grasp the sparrow tail, brush knee twist step was done. The sessions were given 3 days a week, with each session lasting for 60 min, and at the end of 8th week, the participants were evaluated for posttest assessment.

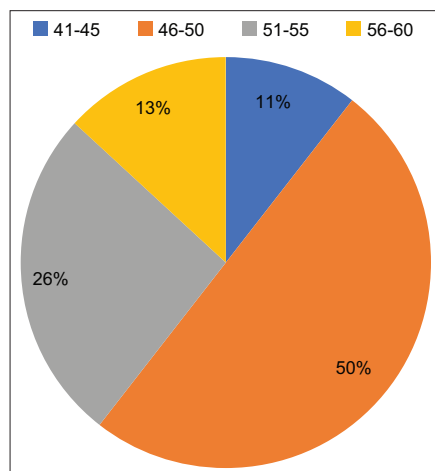
Statistical analysis

Statistical analysis was done by using descriptive and inferential statistics using Student's paired *t*-test for checking significant difference between pre- and posttreatment in a group for parametric variables, and Wilcoxon signed-rank test for nonparametric variables was used. The software used in the analysis was IBM Corp. Released 2011. IBM SPSS Statistics for Windows, version 27.0. Armonk, NY:IBM Corp., with $P < 0.05$ considered level of significance.

Mean and standard deviation were calculated for quantitative variables, and proportions were calculated for categorical variables. The data were represented in the form of visual impressions such as bar diagram and pie charts.

RESULTS

Graph 1 represents the distribution of women who participated in the study. Total numbers of females were distributed according to the four major categories. Majority of females were under the age group of 46–50 years accounting 50% of the whole sample. This can relate to the fact that this was the common age group of working women who were postmenopausal. In



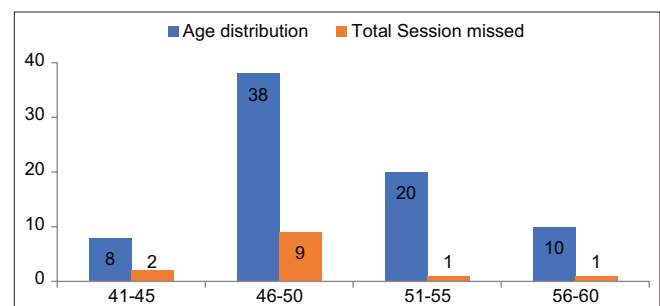
Graph 1: Distribution of females according to age ($n = 76$)

the age group between 41 and 45 years, there were total 8 females consisting of very few of the whole sample. Twenty-six percent of females were between the age of 51 and 55 years, and the remaining 13% covered the age group between 56 and 60 years.

Graph 2 represents the distribution of session missed within the groups which are distributed according to the age. There was only one female in between the age group of 41 and 45 years who missed two sessions in different weeks of exercise. In the age group of 46–50 years, total nine sessions were missed by seven females from which two participants missed the session twice and the others missed only once. In the last two groups of 51–55 years and 56–60 years, only two sessions were missed by two different individuals. The absenteeism was found to be not significant as the total number of sessions completed actively was high in the group. The adherence to the exercise can be explained by having low percentage of women who did not attend the session.

In Table 1, the Sleep Quality Scale scores were analyzed accordingly. Using mean value of sleep score in the postmenopausal working women, the pretreatment value was 48.57 ± 8.31 , and posttreatment, it was 26.61 ± 8.65 . The outcome with higher score indicates poor sleep quality with increased disturbance during the night and difficulties with sound sleep. By using Student's "paired *t*-test," statistically significant improvement was found in mean sleep score at pre- and posttreatment ($t = 7.57$, $P = 0.0001$). The improvement suggests that with 8 weeks of Tai Chi exercise, women had upgraded sleep functions which had a positive impact on their daily living.

Table 2 signifies that the mean QOL score in the participants preexercise was 50.60 ± 9.55 , and post 8-week Tai Chi exercise session, it was 75.42 ± 9.36 . By using Student's paired *t*-test, statistically significant improvement was found in mean QOL score at pre- and posttreatment ($t = 7.56$, $P = 0.0001$). QOL is distributed in major four domains; an improvement in overall QOL is suggestive of complex interaction between the health-related factors and exercise.



Graph 2: Distribution of females according to age group and session missed

Table 3 represents that the mean physical performance score in the women was 21.34 ± 4 during the pretest evaluation, and posttreatment, it was 29.96 ± 2.56 . By using Student's paired *t*-test, statistically significant improvement was found in mean physical performance score at pre- and posttreatment ($t = 19.93$, $P = 0.0001$). Before the treatment, the mean score suggested that individuals belong to the moderate frailty group, and after 8 weeks of Tai Chi intervention, they fit into the category of mild frailty. With the increased score, it is suggested that the components of physical performance which are related to daily activities had benefited the postmenopausal working women in a way that this will also facilitate them in working atmosphere.

DISCUSSION

Advancing age is a common risk factor for various midlife diseases and problems, hence managing the symptoms can impact an individual women's health in a significant manner. A study by Ahuja^[2] noted five different factors having positive correlation with advancing menopausal age in which they reported that more educated women and also the working once had higher menopausal age and can manage symptoms with efficient resources and care. Tajik *et al.*^[22] in 2018 concluded that Tai Chi intervention had beneficial

effects on the perception of QOL in male older people after an intervention given for 8 weeks. Tai Chi exercise is a complementary and an alternative approach which is considered feasible and can be easily implemented for a community setting; it is also very suitable for those who cannot get involved in extreme sports or leisure activity due to mismanaged time for handling work and residence all together. This finding was considerably relatable with that reported by Chang *et al.*^[23] who observed improvements in QOL and physical functioning in patients with end-stage renal disease following a weekly short-form Yang Style Tai Chi session for 12 weeks. Tai Chi exercise is a method to promote the smooth and balanced flow of energy through the body, and can help individuals to achieve a more appropriate control of their bodily movements during exercise and in real-life situations when working. Cui *et al.*^[24] conducted a systematic review in 2019 on the safety of Tai Chi which concluded that with a variety of ages, conditions, and intervention protocol, Tai Chi exercises are not prone to increase the incidence of serious or intervention-related harmful events. The most reliable reason for the safety could be considered Tai Chi exercise being more of monitored approach and also a group-based session which incorporated more interest among individuals developing better communication skills and socialization to tackle issues with postures and movements. A study by an Indian author, Bobby^[25] in 2020 conducted a study on Tai Chi Exercises in improving dynamic balance and gait in older adults who supported our study by providing evidence that Tai Chi exercise is more effective than minimal physical exercise intervention in improving the outcomes. A systematic review titled Tai Chi exercise for QOL in perimenopausal women was conducted in 2017 by Ying Yang *et al.*^[16] which included five clinical trials which concluded that Tai Chi exercise may have a moderate beneficial effect on the QOL of perimenopausal women, as indicated by increases in SF-36 scores as well as the spine dimension of bone mineral density. Another systematic review by Sun *et al.*^[26] in 2016, studied different randomized control trials that explored the efficacy of Tai Chi exercise on bone health among perimenopausal and postmenopausal older women but yielded inconclusive results. The reason explained was due to insufficient quality of methodology with limited reliability. Wayne *et al.*^[27] in 2012 studied the impact of Tai Chi exercise on multiple fracture-related risk factors in postmenopausal osteopenic women. The authors observed that a clinically relevant tendency of Tai Chi attenuates bone loss and improves QOL in postmenopausal osteopenic women. This study showed significant improvement in bone mineral density and

Table 1: Comparison of mean difference of Sleep Quality Scale score pre- and posttreatment

	Mean	n	SD	SEM	Mean difference	t
Pre t/t	48.57	76	8.31	0.95	21.96±10.27	7.57
Post t/t	26.61	76	8.65	0.99		P=0.0001 (significant)

SD: Standard deviation, SEM: Standard error mean

Table 2: Comparison of mean difference of quality-of-life score pre- and posttreatment

	Mean	n	SD	SEM	Mean difference	t
Pre t/t	50.60	76	9.55	1.09	24.82±10.23	7.56
Post t/t	75.42	76	9.36	1.07		P=0.0001 (significant)

SD: Standard deviation, SEM: Standard error mean

Table 3: Comparison of mean difference of Physical Performance Test score pre- and posttreatment

	Mean	n	SD	SEM	Mean difference	t
Pre t/t	21.34	76	4.00	0.45	8.61±3.76	19.93
Post t/t	29.96	76	2.56	0.29		P=0.0001 (significant)

SD: Standard deviation, SEM: Standard error mean

also reduced risk of falls with improved outcomes for QOL. The mechanism behind a positive result in the study by Wayne and colleagues is that Tai Chi being a complex, multicomponent intervention, and it is possible that it impacts bone remodeling via multiple processes which could further improve balance and gait parameters that ultimately lead to better QOL with reduced fall and fracture risk. A systematic review by Du *et al.*^[28] in 2014 studied the effect of Tai Chi exercise for self-rated sleep quality in older people. They included five randomized control trials and found weak evidence showing that Tai Chi exercise has a beneficial effect in improving self-rated sleep quality for older adults. They included five randomized control trials and found weak evidence showing some improvement in the given population. Tai Chi being a form of aerobic exercise which is performed slow and gentle in combination with diaphragmatic breathing and relaxation. This results in declined sympathetic output and enhanced feeling of wellbeing suggesting that Tai Chi could be an effective alternative and paired approach to existing therapies for older people with sleep problems. A study by Lü *et al.*^[29] in 2017 on the effect of Tai Ji Quan training on self-reported sleep quality in elderly Chinese women with knee osteoarthritis included 46 elderly women with one group who performed exercises for three times a week for 24 weeks and another group who only had educational classes. After the analysis, the authors found that the participants in intervention group had significant improvement in sleep quality and physical performance by reducing pain around 39% and also improving QOL.

CONCLUSION

Our study revealed that besides being low velocity and low impact exercise, Tai Chi was a safe and effective mode of treatment in postmenopausal working women. Tai Chi exercise has shown significant improvement in sleep behavior and also physical performance which further efficiently impacted health-related outcomes of QOL as an affirmative approach. There are many similar group exercises (aerobics, yoga, cycling, and calisthenics) which produce beneficiary effects on the subjects. These kinds of exercises have been studied well by the researchers. It may also have positive psychological effects in healthy individuals who undergo normal aging. Our study had a positive position other than having significant results in sleep outcomes, physical performance, and QOL. First, being conducted as a group approach, it had become interactive and improved socialization skills during the pandemic strictly adhering to the COVID-19 protocols. This approach also helped to cover a larger population at a

time to minimize the workload. Another positive point was the adherence to the exercise, as the absenteeism was relatively low. Finally, our study used two major self-administered questionnaires which helped every individual to understand the fact of responsiveness toward oneself.

Our study showed some limitations like QOL questionnaire is sub divided into four main domains which were not taken separately. So, it provided with only apparent assessment of QOL in post-menopausal women. Another limitation was the population which was included were already active during the time of pandemic, this somewhere has advanced the outcomes. Any kind of systemic involvement and effect of marital status on the outcomes was not assessed. And also, the study with larger sample and prolonged duration can be conducted in future.

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Conflicts of interest

There are no conflicts of interest.

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