Review Article

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A Review of the Effect of Yoga, Ayurveda, and Tai Chi on Depression in Older Adults

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Abstract

Depression in older adults occurs for various interpersonal, financial and physical health-related reasons. The medication used in the management of depression can result in falls, confusion, and disorientation in the elderly. Hence there is an interest in complementary and alternative therapies in managing depression in this age group. This article examines ten studies indexed in PubMed in which three Asian systems of healing, that is yoga, Tai Chi and Ayurveda have been used to manage depression in older adults who have (i) uncomplicated depression, and (ii) depression along with other medical conditions. While some of the trials were well designed with a good percentage at follow-up, it is apparent that there still remains a lot of research needed in this potentially useful area. Yoga and Tai Chi were found to be useful in depression in older adults. Another point which emerged is possible harmful drug-herb interactions when Ayurveda poly-herbal preparations are used in older adults receiving medication for some other condition.

Keywords: Depression; Yoga; Ayurveda; Tai Chi.

Introduction

Depression has been identified as a significant but preventable cause and result of disability among older adults.[1]

Depression in Old Age: Causes and Consequences

Depression in old age may occur after life events such as the death of a spouse, economical reasons, and health problems.[2] This is often mistreated or under treated, and also under diagnosed. There are several reasons for this. Older people reduce their social relations, depression often presents as co-morbidity with organic diseases which may mask the condition, and there is a misconception that a depressive state is normal in older people. Loneliness is also recognized as a problem particularly associated with old age.[3] Patterns of loneliness among adults aged 15 years and older, were studied using data from the European Social Survey. Loneliness demonstrates a non linear U-shaped distribution, with those under 25 years and those over 65 years demonstrating the highest level of loneliness. For those in later life the quality of social engagement is protective against loneliness.

The consequences of depression can be serious, and can even result in suicide.[4] Apart from this depression may influence progress of any co-morbid condition. Depression in older adults may also be associated with non adherence to drug treatment for co-morbid conditions.[5] While it is generally recognized that depression may cause a person to be at higher risk of developing other illnesses the extent of the association between depression and non-psychiatric hospitalization episodes was determined based on hospital events from 1995 to 2006, obtained from the Dutch National Medical Register.[6] After 12 months 14 percent of people with depression were

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hospitalized compared to 10 percent of non-depressed individuals. Also depression is associated with an increased risk of mortality among institutionalized individuals older than 60 years.[7]

Complementary and alternative therapies (yoga, Ayurveda and Tai Chi) in the management of depression in old age

Conventional medication for depression in older persons resulted in undesirable side effects such as confusion, agitation[8], falls[9], psychomotor performance deficits, dysphoric mood, impaired intellectual functioning, and day-time sleepiness.[10] Perhaps this may explain why older adults with self perceived depressive disorders have shown an increased use and satisfaction with herbal or homoeopathic remedies, acupuncture, and relaxation techniques for older adults.[11]

Among alternative interventions yoga is an ancient Indian science and way of life which includes relaxation and a 'balanced' mental state.[12] Yoga includes several techniques such as physical postures (*asanas*), regulated breathing (*pranayama*), meditation and philosophical principles. Ayurveda is also an ancient Indian discipline.[13] In the definition of Ayurveda, *ayus* means 'life' and *veda* means 'knowledge' or 'science'. The literal meaning of Ayurveda in Sanskrit is hence 'the science of life' [14]. Health measures used vary widely and include massage and poly-herbal preparations as well as guidelines for various aspects of a person's lifestyle which may include their diet, physical activity and other aspects.

Another Asian traditional technique is Tai Chi, a Chinese mind-body exercise which enhances balance, strength, flexibility, self-efficacy, and reduces pain, depression and anxiety in patients with chronic conditions.[15] All three traditional techniques believe in balancing the subtle life energy (Chi in Chinese medicine; Prana in Indian medicine) for normal health, apart from other similarities.

Methodology

This review examined ten articles indexed in PubMed, which discussed the use of yoga, Ayurveda or Tai Chi in the management of depression in older persons. Articles included in other bibliographic databases were excluded as the authors did not have access to them. PubMed was selected for convenience as the citations and abstracts are available without any charge. This is a limitation of the review. After getting the citations the full papers were obtained.

The articles were classified as two categories, (i) those which used yoga, Ayurveda and/or Tai Chi to manage uncomplicated depression in older persons, and (ii) where the same therapies were used to manage depression which co-existed with some other disease. The ten studies were evaluated according to "Levels of evidence for randomized controlled trials (based on the Oxford Center for Evidence-based Medicine) which is summarized in Table 1.

Table 1: Levels of Evidence for Randomized Controlled Trials (Based on the Oxford Center for Evidence-Based Medicine)

Evidence level	Study design
1	High quality RCTs with narrow confidence intervals
2	Low quality RCTs or high quality cohort studies
3	Case-control studies
4	Case series or poor case-control studies or poor cohort studies or case reports

- High quality RCTs are those having narrow confidence intervals and > 80% follow-up rate.
- Low quality RCTs are those with wide confidence intervals, < 80% follow-up rate.
- The center for Evidence-based Medicine additionally defines case-control studies and low quality cohort studies as "those which have not clearly defined comparison groups and/or failed to measure exposure and outcomes in the same (preferably blinded), objective way in both exposed and non-exposed individuals and/or failed to identify or appropriately control known confounders and/or failed to carry out a sufficiently long and complete follow-up of patients."

Review

The management of depression in older persons without any other disease, using yoga, Ayurveda and Tai Chi.

There were six studies in this category. All of them examined the effect of yoga, Ayurveda or Tai Chi on psychological wellbeing and depressive symptoms in older adults.

The earliest study, was a three-arm randomized controlled trial in which 69 community dwelling older adults (aged 60 years and older) were randomized as three groups, viz., Yoga, Ayurveda and Wait-list control, with 23 participants each.[16] Participants of both sexes who were older than 60 years and living in a residential home were included. Participants having the following health problems: uncontrolled diabetes, uncontrolled hypertension, neurological disorders, dementia, hearing impairment and a detected case of non infectious Hansen's disease were excluded. Yoga was practiced for 75 minutes, 6 days a week for 24 weeks. The Ayurveda group received a poly-herbal preparation twice in a day and the prescribed dose was 10 grams. Assessments were at baseline and after 3 and 6 months, using the short version of the Geriatric Depression Scale.[17] The reliability of the scale for the population studied had been established. The three groups had comparable scores at baseline. The yoga group alone showed a significant decrease in scores after 3 and 6 months. The data were analyzed using a repeated measures analysis of variance. Effect sizes and Cohen's *d* were not mentioned. The study had four main limitations. These were (i) a small sample size (which had not been calculated prior to the study), (ii) participants lived in a residential home and were not financially independent, hence findings may not apply to financially independent older adults living at home, and (iii) the participants had no health problems, hence the findings may be different in older adults with health problems.

In another study there were 51 participants aged 50 years or older.[18] The study aimed at comparing mood and state anxiety changes produced by an acute bout of yoga or walking among older adults, and also comparing the mental health of older adults who practiced either yoga or walking. Pre and post assessments were carried out in relation to an acute bout of exercise. Also, as a cross-sectional study the mental status of older adults who had been practicing yoga (group average 74.9 months) or walking (group average 75.7 months was assessed). The baseline characteristics of the yoga and walking groups differed in some aspects. Data were analyzed using a repeated measures multiple analysis of variance. In the cross-sectional study (which compared yoga practitioners with those who walked), walkers had significantly lower levels of depression and higher levels of quality of life compared with yoga participants. However, these findings are limited by differences between the groups, with the yoga group being significantly younger, having a greater annual income, and being more educated compared with the walking group. There were other limitations of the study. The method of recruiting the participants, the way in which the sample size was determined and the inclusion and exclusion criteria were not mentioned. The time of the day when data were collected differed between groups with the data of the yoga group being collected in the evening, whereas that of the walking group was collected in the morning. Other limitations of the study included the small sample size, the fact that the sample consisted chiefly of Caucasian women and hence was not representative of the entire population, and finally the health status of both groups was not determined which could be expected to influence the results.

The level of depression, sleep quality and self-perception of health status in 139 older adults (over 60 years of age) in Taiwan was determined.[19] To be included in the study, participants had to be (i) community-dwelling adults aged 60 years and over, (ii) having no previous training in yoga, (iii) able to walk without assistance, (iv) cognitively alert (based on the Short Portable Mental Status

Questionnaire), and (v) independent or mildly dependent for self care indicated by a Barthel index of 91 or more. The participants were randomized as an experimental (n = 62) and a control (n = 66) group. The required sample size in each group was 56 (power = 0.8, alpha =.05). The yoga program (Silver Yoga exercise) included warm-up, gentle stretching, relaxation and guided-imagery meditation. Assessments were made at baseline and after 3 and 6 months. All scales used were assessed and found suitable for their reliability and validity, when used in a Taiwanese population. Data were analyzed with a two-way analysis of variance. At 6 months the yoga group had lower depression scores, better self-perceived physical and mental health, and improved quality of sleep compared to the control group. The study had five main limitations which limit generalizing the findings. These were: (i) at baseline the two groups were significantly different with regard to age, gender, marital status, and number of chronic illnesses, (ii) not all the participants in the clusters took part in the study and clustering was not considered in the analysis, which could reduce the statistical power and reliability of the results, (iii) two participants with low attendance rates (≤50%) were excluded; their reaction to the yoga program could be of interest, and (iv) the population were healthy older adults, who were highly educated, had good food habits and exercised regularly. It remains uncertain whether older adults without this kind of lifestyle would have had the same benefits.

Like the study cited above[19], another study was carried out on 69 older residents of an assisted living facility who were randomized as a yoga (n = 38) and a control (n = 31) group. [20] To be included in the trial, participants had to be (i) frail elders aged 65 years or more, with a Barthel Index Score of 91-99 (mildly functionally dependent), (ii) naïve to yoga, (iii) able to walk without assistance, and (iv) cognitively intact based on a Mini-Mental State Examination Score of 24 or more. Depression was assessed using the Taiwanese Depression Questionnaire and sleep quality was assessed with the Pittsburg Sleep Quality Index. Data were analyzed using a mixed-design two way analysis of variance. Effect sizes and Cohen's *d* were not reported. At the end of 6 months of Silver Yoga (described earlier), the yoga group showed a decrease in depression scores, reduced daytime dysfunction and better quality of sleep compared to the values of the yoga group at baseline, and of the control group at 6 months.

There were three limiting factors of the study. First, though random assignment by study sites was applied, it is possible that some elders who met the sample selection criteria were not recruited as they were outside targeted institutions. Second, more than half of the recruited participants exercised regularly, which may have affected the results. Finally the drop-out rate was high, i.e., 20 percent.

The fifth study in this category (healthy elders with symptoms of depression but of no other illness), was conducted on depressed women who were members of a cultural community center for older women, in Iran. [21] Seventy women (aged 60 to 80 years) were chosen out of 500 from the district. To be included in the trial participants had to score 10 or more in the Geriatric Depression Scale (where scores of 10 to 19 = moderately depressed). The questionnaire was validated for use in Iranian persons (validity = 96 percent). The 70 participants were otherwise healthy. They were randomized as a 'Laughter Yoga' group (n = 23), an exercise therapy group (n = 23) and a control group (n = 24). At baseline the three groups were comparable. Laughter yoga is primarily an exercise which includes breathing, stretching and laughter (without any basis, such as jokes or humor). Data were analyzed with an analysis of co-variance, controlling for the possible effect of pre-test scores. Effect-sizes and Cohen's *d* were not reported. After ten sessions, the laughter yoga group showed an improvement in depression and life satisfaction comparable to exercise therapy. The study had two limitations. (i) The sample size was small. (ii) It is recommended that Laughter Yoga is practiced in green parks and open spaces. For

socio-cultural reasons this was not possible. However there is no mention of whether the sessions were on consecutive days or were less frequent.

In a study involving Tai Chi participants (n = 332) aged 60 years and older, 112 persons who met the criteria for unipolar major depressive disorder were included in the study [22]. All participants met the following criteria: (1) a current episode of major depressive disorder, (2) a 24 item Hamilton Depression rating scale score of 16 or higher at baseline, and (3) Mini-Mental State Exam score of 26 or higher. Participants were excluded from the trial: (1) if they had a history of psychiatric illness (other than generalized anxiety disorder) or substance abuse, (2) acute suicidal or violent behavior (3) severe or acute medical illness, (4) any other central nervous system disease or dementia, or (5) were not mobile. Of the 112 participants who entered the trial, 73 participants continued in the trial. The 73 participants were randomized as a Tai Chi group and a health education group. The interventions were for 10 weeks. The baseline characteristics of the two groups were comparable. The sample size was not determined statistically and the power was not mentioned. Data were analyzed using mixed models analyses of variance. The Tai Chi group showed greater improvement in depression, health related quality of life and memory compared to those receiving health education. Both groups were simultaneously receiving escitalopram. Hence the study demonstrates the possible use of Tai Chi as an add-on therapy in older, depressed adults. The ability to generalize the findings was limited by the following factors: a relatively small sample size, a brief follow up, the fact that the participants had moderate to major depression, and the findings may not be generalizable to severely depressed older adults.

Hence there appears evidence that yoga and Tai Chi can have a positive effect on healthy elders, reducing their depressive symptoms and causing other beneficial changes well.

Depression in older adults secondary to some other illness, managed by complementary and alternative therapies

There are four published studies covering this topic. The earliest study evaluated the use of Tai Chi and computerized balance training to reduce frailty and falls in older persons living in the community.[23] There were 200 participants aged 70 years and older who were randomized as three groups, Tai Chi (TC), Computerized balance training (BT) and an Education exercise (ED) control group. The sample size was calculated using the grip strength as the variable for the power calculation. All three groups were assessed for biomedical, functional and psychosocial indicators of falls. The three groups were assessed at the beginning and at the end of the 15 week intervention. Participants were included in the study if they met the following criteria: (i) age 70 years or more, and (ii) living in an unsupervised environment and ambulatory. In this study participants were healthy but frail. Participants were excluded from the trial if they had debilitating conditions such as severe cognitive impairments, metastatic cancer, crippling arthritis, Parkinson's disease, or a major stroke, or profound visual defects which could compromise balance or movement. From 997 persons who were screened 200 conformed to the criteria and consented to be randomized into three groups. The TC classes synthesized 108 forms of Tai Chi into 10, BT involved use of a balance system, while the ED group was instructed not to change their exercise levels throughout the study and follow-up periods and hence served as a control for exercise applications. They met weekly to discuss topics of research interest to older people, with a researcher. There were both primary and secondary variables. The Chi-square test or Fisher exact test was used to determine the significance of differences for categorical variables, while the ANOVA, F test or Kruskal-Wallis test was used for continuous variables. The three groups were comparable at baseline. After 15 weeks the TC group showed a decrease in number of falls as well as better psychological well-being with a decrease in fear of falling. The effect sizes and the limitations of the study were not reported by the authors.

The second study (chronologically) was a single case report of a 53 year old woman who was being treated for unipolar depression on a maintenance dose of 50 mg sertaline, who sought ayurveda treatment for chronic back pain.[24] Ayurvedic herbal preparations contain complex ingredients. It is possible that a drug-herbal interaction occurred, as three weeks after taking the ayurveda treatment the patient developed an acute episode of depression after being stable on medication for two years. The ayurveda preparation was stopped and the patient returned to the level she was at before taking the ayurveda treatment. A year later the patient took ayurveda treatment again for back pain, and once more developed features of depression including suicidal ideation within two weeks. On stopping the ayurveda treatment the patient returned to the level she was at, before treatment. The authors attributed the acute depression episodes to a herbal-sertaline interaction. The interaction could be either a pharmocodynamic or a pharmacokinetic one. Which herb was implicated and the mechanism was not clear, though the report emphasizes the importance of using poly-herbal preparations with care in persons already on medication for some other condition.

In another study on 40 persons with a group mean age of 65 years who had tibiofemoral osteoarthritis (OA) of the knee, patients were randomly assigned to Tai Chi or to Attention Control for 12 weeks.[25] To be included in the trial patients had to meet the following criteria: age e"55 years, body mass index d"40 kg/m^2, WOMAC pain sub scale score >40, and fulfillment of the American College of Rheumatology criteria for knee OA with radiographic Kellgren and Lawrence knee OA grade e"2. Individuals were excluded from the trial if they had prior Tai Chi training (or training in Qi Gong, yoga or allied disciplines), serious medical conditions, intra-articular steroid or hyaluronate injections in the previous six months, and those unable to pass the Mini-Mental State Examination (i.e., scores<24). Random assignment to the two groups was by a statistician, using computer generated numbers. Tai Chi sessions were 60 minutes, twice weekly for 12 weeks. The education program included two 60-minute class sessions each week for 12 weeks. The mental status was assessed based on the Mental Component of SF-36. The sample size was not determined statistically and power and effect sizes were not reported. Data were analyzed with an intention-to-treat basis. The baseline characteristics of the two groups were well balanced. Mixed model analyses of variance were used. Tai Chi improved the physical function and reduced pain in this group of patients with knee OA. Measures of psychological well-being (depression and self-efficacy) were better after the 12 week period and further improved after that. The study had four main limitations. At baseline the Attention Group had more severe knee OA (based on WOMAC physical function, radiography and self-reports). Also it was not possible to mask the participants to the treatment assigned. Hence *a priori* beliefs about the effects of Tai Chi might have influenced the outcome. Another limitation is that instruction was by a single Tai Chi master which was considered by the authors to limit generalizability. Finally though patients were instructed not to communicate with the blinded assessors about their group assignment, the authors state that this might have occurred even though the study physician did not report such leakage. The importance of this study lies in the fact that knee OA is common in older adults and in additional to the physical symptoms has mental consequences as well.

Older adults with dementia in long-term care facilities were recruited for a trial to see whether yoga could benefit them.[26] Sixty-eight elderly people with dementia residing in a long-term care facility in Taiwan were recruited. The inclusion criteria were (i) aged 60 years and over, (ii) diagnosed with dementia based on the definition in DSM-IV, (iii) a Mini-Mental State Examination score of 18-23, (iv) living in a long-term care facility for at least 6 months, and (v) not having participated in any exercise sessions for six months. Participants were randomized as a Silver Yoga group and a control group. The sample size was not

determined statistically and the power was not reported. Depression was assessed using the Cornell scale for depression in dementia. Among various other physical measurements, depression scores significantly reduced in the yoga group. The study was limited by: the design (convenient sampling, not randomization), a small sample size, and limited facilities (i.e., exercising in a public area, not separated from other activities). Hence this study suggests that yoga is beneficial for elders with dementia, despite the difficulties involved in training persons with dementia such as behavioral problems and difficulty in comprehension.

Conclusion and Summary

The ten studies that used yoga, Tai Chi or Ayurveda as interventions for depression in older persons were evaluated according to "Levels of evidence for randomized controlled trials (based on the Oxford Center for Evidence-based Medicine) which are summarized in Table 1. Four studies showed Evidence level 1, three studies showed Evidence level 2 and two studies showed Evidence level 3.

Hence there appear to be a few well designed trials to support the use of yoga and Tai Chi in managing depression in the elderly. The study also brought out the fact that Ayurveda poly-herbal preparations are to be used with care in older adults who are being medicated for some other condition. On the whole the use of complementary therapies (such as yoga, Tai Chi and Ayurveda) appear worth exploring to manage depression in the elderly.

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