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Tai Chi Chih

An Exercise Option for Older Adults

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KEYPOINTS:

1. Physical inactivity is a leading cause of morbidity and mortality among elders.
2. Nurses are frequently in the position to recommend and encourage exercise and activity for clients.
3. Tai Chi Chih is a safe and enjoyable form of exercise that may be ideal to improve and maintain physical function in older adults.

ABSTRACT

The purpose of this study was to determine the effects of Tai Chi Chih on balance, flexibility, mood, health status, and blood pressure in a sample of community-dwelling elders. A quasi-experimental pretest-posttest design was used in the study. Participants were recruited from a senior center located in the suburbs of a large metropolitan area. The experimental group consisted of 24 volunteers over the age of 55 who performed 60 minutes of Tai Chi Chih once a week for 10 weeks and practiced at home. The control group consisted of 22 volunteers who continued with their current level of activity. Analysis of covariance revealed a significant difference between the two groups on balance ($F=4.3, p<.05$). This study suggests that Tai Chi Chih is a safe and enjoyable form of exercise that might improve balance in community-dwelling elders.

INTRODUCTION

Only 32% of elders exercise on a regular basis (National Center for Health Statistics, 1992). Exercise can reduce the inactivity induced loss of strength, mobility, balance, and endurance that are vital for the safe performance of activities of daily living for older adults (Ory et al., 1993). Exercise is also recommended for the treatment and prevention

of complications from coronary heart disease, hypertension, non-insulin dependent diabetes, osteoporosis, and depression (Harris, Caspersen, DeFriese, & Estes, 1989). Nurses working with older adults can be strong advocates of exercise. An awareness of the many forms of exercise available and how elders benefit is essential to promoting informed selection of an exercise modality.

The health benefits of Tai Chi Chuan (Tai Chi), a centuries old form of Chinese exercise and meditation, have not been fully established, yet evidence suggests that it is a safe form of moderate intensity exercise (Kirsteins, Dietz, and Hwang, 1991; Zhuo, Shephard, Phyley, & Davis, 1984). There has been little research into the benefits of Tai Chi for the elderly population. The purpose of this study was to evaluate the effects of Tai Chi Chih (TCC), a modified form of Tai Chi, on balance, flexibility, mood, health status, and blood pressure in a group of community-dwelling elders. The hypotheses tested in this study were:

1. Practitioners of TCC will perform better on tests of balance than non-practitioners.
2. Practitioners of TCC will perform better on a test of flexibility than non-practitioners.
3. Practitioners of TCC will have better mood scores than non-practitioners.
4. Practitioners of TCC will report better health status than non-practitioners.
5. Practitioners of TCC will have lower blood pressures compared to non-practitioners.

LITERATURE REVIEW

Both observation and intervention studies suggest that exercise is beneficial to the health of older adults (Buchner, Beresford, Larson, LaCroix, & Wagner, 1992; Wagner, LaCroix, Buchner, & Larson, 1992). Exercise is thought to reverse or retard the physiological decline associated with aging and disuse, and improve psychological parameters and quality of life (Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991; Smith, Difabio, & Gilligan, 1990). Recent studies using exercise interventions with elders have shown improvements in balance, reaction time, strength, and flexibility (Judge, Lindsey, Underwood, & Winsemius, 1993; Lord & Castell, 1994).

Findings from the FICSIT (Frailty and Injuries; Cooperative Studies of Intervention Techniques) Project indicated that Tai Chi significantly reduced the risk of falls in elders (Province et al., 1995). Tai Chi has also been effective in improving balance (Tse & Bailey, 1992), improving normal gait velocity, and producing a trend toward maximal gait velocity in elders (Judge, Underwood & Gennos, 1993). Several authors have reported that practitioners of Tai Chi have greater lower extremity flexibility than their

non-practitioner cohorts (Qu 1980; Zhuo, Shephard, Phyley, & Davis, 1984). Levandoski (1986), however, found that a 12-week Tai Chi intervention did not improve trunk or lower extremity flexibility.

METHODS

Design

A quasi-experimental design was used for this study. Elders on the mailing list of a large senior center who met the study criteria and consented to participate, self-selected into either the experimental group or control group. Those in the experimental group participated in a 10-week program of TCC exercise. They attended one 60-minute session per week and were asked to practice at home at least three times per week. During the same 10-week period, subjects in the control group were instructed to continue with their current level of activity. Measures were taken one week prior to the intervention and again 11 weeks later.

Intervention

TCC, a westernized form of the ancient Tai Chi Chuan, consists of 20 simple, repetitive, non-strenuous movements that involve no physical contact and emphasize a soft, flowing continuity of motion. Justin Stone, a Tai Chi Chuan Master and teacher of Eastern philosophies, developed TCC after finding that the ancient Tai Chi Chuan was difficult to learn and required years of practice to obtain the benefits (Stone, 1994). The result was a simplified form that could easily be learned, and the benefits could be garnered in weeks instead of years. The five principles of movement essential to TCC are: a) hand and leg movements should be synchronous; b) the emphasis should be on a soft, relaxed position rather than a hard, tense position; c) moves should be practiced with a quiet and open mind; d) soles of the feet should be rooted to the ground with the knees bent in a low stance, and the primary focus of awareness within the lower abdomen; and e) the physical force should be rooted in the feet, pass up through the legs as weight is shifted, and distributed by the pivoting of the waist (J. Apt, personal communication, 1994).

Instrumentation

Balance was measured by the Single Limb Stance Timed Test (SLST) or one legged standing test. Both the "eyes open" and "eyes closed" forms of the test were used. The SLST has been used extensively in studies of balance and exercise with elders (Rikli & Busch, 1986; Topp, Mikesky, Wigglesworth, Holt, & Edwards, 1993). Internal

consistency reliability coefficients of .85 to .95 have been reported (Rikli & Edwards, 1991).

Trunk and hamstring *flexibility* were measured by the modified Sit and Reach Test (SRT) (Hoeger, 1986). The SRT is a widely used measure of flexibility and is part of many large fitness batteries (Minkler & Patterson, 1994). A test-retest reliability of .83, and interclass reliabilities of .98 and .99 have been reported when the SRT is used with elders (Frekang & Leslie, 1975; Shephard, Berridge, & Montelpare, 1990).

Mood was measured by the Profile of Mood States (POMS) inventory (McNair, Lorr, & Droppleman, 1981). The POMS is a 65-item adjective questionnaire with a 5-point Likert-type rating scale. It measures the presence and intensity of tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. The internal consistency reliabilities in this sample ranged from .80 to .93, and were similar to those reported by other researchers (McNair, Lorr, & Droppleman, 1981).

Health status was measured by the Short Form-36 (SF-36), which contains eight subscales: physical functioning, role functioning, social functioning, bodily pain, general mental health, emotional health, vitality, and general health perceptions (Ware, 1993). Each item has a Likert-type response set, and each of the scales is scored separately. Cronbach's Alpha coefficients (internal consistency reliability) ranging from .77 to .90 have been reported (Ware, 1993). Cronbach's Alpha coefficients calculated for this sample ranged from .75 to .93.

Systolic and diastolic blood pressure (SBP/DBP) were indirectly measured by a manual sphygmomanometer according to the guidelines established by the American Heart Association (American Heart Association, 1989).

Since the sample selection procedure for this study did not control for group differences at baseline, it was necessary to collect data on variables with the potential to act as confounders. Potential confounders included age, gender, physical activity level, compliance, medication use, and locus of control.

Analysis

Analysis of variance (ANOVA) and t-tests were used to determine differences between the two groups' pretest scores. Comparison of variables from pretest to posttest was done using analysis of covariance (ANCOVA) with the pretest score for each variable serving as a covariate.

RESULTS

The final sample consisted of 46 subjects (24 experimental and 22 control). The average age of participants was 70 years ($SD=5.9$), and their average level of education was 14.5 years ($SD=3.1$). Annual household income ranged from \$7,000 to over \$51,000 with 50% reporting incomes over \$21,000. No significant differences were found between the two groups on demographic characteristics. However, one pretest dependent measure was significantly different, with the control group reporting that emotional problems had less of a restriction on their activities than the experimental group ($t=-2.30$, $p<.04$). Pretest data also indicated that the control group was more active than the experimental group ($z=-2.423$, $p<.03$ and $z=-1.945$, $p<.05$).

The data supported hypothesis 1: the TCC intervention resulted in a significant improvement in the eyes-open portion of the balance test. The TCC group's mean score improved 50% from pretest to posttest ($M=7.17$, $SD=7.01$ to $M=10.81$, $SD=12.38$) while the control group's scores decreased by 2% ($M=13.14$, $SD=13.84$ to $M=12.85$, $SD=15.29$). ANCOVA on the posttest scores, with the pretest scores and the scores from the activity level measures entered as covariates, revealed a significant difference between the groups ($F=4.3$, $p<.05$). The adjusted means were 14.78 (TCC) and 8.88 (control). There were no significant differences between the two groups on the eyes-closed portion of the balance test. Hypotheses 2 through 5 were not supported.

The average number of TCC sessions attended was 8.3 with a range from 5 to 10. Almost 80% of the participants attended 8 or more sessions. The TCC group practiced at home an average of 3 to 4 times per week. Almost two-thirds (62.5%) of the group attended 6 or more sessions and practiced at least 3 days per week at home.

DISCUSSION

This is the first controlled study to report an improvement in balance after a TCC intervention in older adults without previous Tai Chi experience. Previous findings supporting Tai Chi as a method to improve the balance of older adults compared experienced practitioners to non-practitioners (Tse & Bailey, 1992). These results add to the existing evidence that exercise in older adults improves balance (Judge, Lindsey, Underwood, & Winsemius, 1993; Lord & Castell, 1994). The fact that the improvement in balance occurred despite the variations in compliance with home practice suggests that benefits may be obtained without becoming an expert and without the daily practice that the Masters suggest (Stone, 1994). The data also suggest that balance can be enhanced during the learning process. The results of this study support Levandoski's (1986) findings that a 12-week Tai Chi intervention did not improve trunk or lower extremity flexibility.

Studies cited earlier that reported improved flexibility with Tai Chi used much younger subjects (Zhuo, Shephard, Phyley, & Davis, 1984), or compared experienced practitioners with beginners (Qu, 1980). It is possible that TCC, as opposed to other

forms of Tai Chi, does not significantly affect hip or hamstring flexibility because the movements are less exaggerated and involve less bending.

The findings on the mood variables do not concur with those reported earlier. It is possible that the meditative effects advocated by Tai Chi Masters (Man-ch'ing, 1981; Stone, 1994) cannot be adequately developed over a 10-week period. Another explanation for the findings is that the sample's very low scores at baseline, reflecting a positive affect, left little room for improvement in mood.

The lack of improvement on the SF-36 subscales may be attributed to two factors. First, the SF-36 is considered a global health status measure (Ware, 1993), and might not be sensitive or specific enough to detect changes in a short-term exercise program. Second, the high scores for this sample indicate that it might be difficult to detect improvements in those persons already in good health.

While the reductions in blood pressure in the TCC group were not statistically significant, a 4.6% reduction in SBP and a 3.6% reduction in DBP might be clinically significant in someone with mild to moderate hypertension. The reductions seen may also be enough to delay the need for additional pharmacologic therapy.

LIMITATIONS

The lack of randomization of subjects is a major limitation of this study. The generalizability of the findings also is limited by characteristics of the sample: healthy, physically active, well-educated, and relatively wealthy. Those elders most at risk do not fit this particular demographic profile, and it would be prudent to include a more demographically diverse sample of elders with varying levels of functional status in future studies. The study's small sample size is also a limitation in terms of statistical significance.

NURSING IMPLICATIONS

The results of this study add support to the use of Tai Chi as a form of exercise in older adults. In particular, it supports TCC as a safe and enjoyable form of exercise that can be learned in a short period of time. The physiologic benefits indicate that TCC may be valuable as a method of improving and maintaining balance in high functioning older adults, and may be even more effective in elders with some degree of impaired functioning. TCC has several appealing advantages over other forms of exercise. First, it does not require any special clothing or equipment and therefore is less expensive. Second, once the movements are learned, it can be practiced individually at home or in a

group setting. Finally, the simple, soft, and fluid movements are ideal for elders regardless of previous exercise experience.

Nurses are frequently in the position to assess activity level and recommend exercise as an independent nursing function. It is vital that nurses working with elders are aware of the different forms of exercise that are available and what each method can offer. TCC is another type of exercise that nurses might consider when discussing exercise options with clients. TCC may also be an exercise option for nurses themselves either as a primary activity or as an adjunct to higher intensity exercises. A list of certified TCC instructors in your area can be obtained by contacting Good Karma Publishing, Inc. at (701) 854-7459.

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