EUR J PHYS REHABIL MED 2010;46:69-72

Yoga might be an alternative training for the quality of life and balance in postmenopausal osteoporosis

Ş. TÜZÜN [1], İ AKTAŞ [1], Ü. AKARIRMAK [1], S. SIPAHI [2], F. TÜZÜN [1]

Aim. **Osteoporotic vertebra and hip fractures are major causes of dysfunction, disability, mortality and impaired life quality in the ageing population. In the postmenopausal period, exercises prevent rapid bone loss and increase muscle strength, mobility and flexibility thereby decreasing the risk of falls and fractures. Yoga exercises, which have been an inseparable part of Eastern culture for hundreds of years, are now being used in the field of osteoporosis rehabilitation. Yoga has a positive effect on balance, posture, flexibility, and life quality resulting from its effects on balance, stretching, relaxation and strengthening. The aim of this study was to evaluate the effect of yoga exercises in postmenopausal osteoporotic women on balance and life quality and to compare the results with a classic osteoporosis exercise program.**
Methods. **Twenty-six postmenopausal osteoporotic women over 55 years of age were included in the study. A neuromuscular test battery and the QUALEFFO as a life quality index were used for the assessment of balance and life quality, respectively.**
Results. **The results showed that yoga education has a positive effect on pain, physical functions, social functions, general health perception and balance.**
Conclusion. **In conclusion, yoga appears to be an alternative physical activity for the rehabilitation of osteoporotic subjects.**

KEY WORDS: Osteoporosis, postmenopausal - Yoga - Exercise - Postural balance - Quality of life.

[1]*Physical Medicine and Rehabilitation Department*
Division of Osteoporosis, Istanbul University
Cerrahpaşa School of Medicine
Istanbul, Turkey
[2]*Internal Medicine Department*
Istanbul University
Cerrahpaşa School of Medicine, Istanbul, Turkey

Osteoporotic vertebra and hip fractures are major causes of dysfunction, disability, mortality and impaired life quality in the ageing population. Exercises in the postmenopausal period prevent rapid bone loss and increase muscle strength, mobility and flexibility. Additionally, exercises in elderly osteoporotic females decreases the risk of falling and fractures because of their positive effects on balance.[1-3] Yoga exercises, which have been an inseparable part of Eastern culture, have been reported to be beneficial in osteoporosis rehabilitation in some trials.[4, 5] Because of the balance, stretching, relaxing and strengthening components of yoga, it has a positive effect on tenseness, insomnia, depression, posture and possibly bone mineral density (BMD) in postmenopausal women.[4-6]

The effects of yoga in postmenopausal osteoporosis include the maintaining of emotional stability, increasing in body flexibility, and improvement of posture, balance, and coordination. Disclosing the potential self-energy and using that for physical and mental harmony can increase the physical awareness.

The aim of this study was to show the effect of

Acknowledgements.—We would like to thank to Mr. Lütfü Bozkurt for yoga training. We are grateful to Ms. İpek Erbil from Sanofi-Aventis, Turkey for supporting us during the study.
Received on July 21, 2009.
Accepted for publication on January 21, 2010.
Epub ahead of print on February 18, 2010.

Corresponding author: Prof. Dr. Ş. Tüzün, Istanbul University Cerrahpaşa School of Medicine, Physical Medicine and Rehabilitation Department, Division of Osteoporosis, Cerrahpafla Tıp Fakültesi 34098, Cerrahpaşa, Istanbul, Turkey. E-mail: sansin@istanbul.edu.tr

yoga training in postmenopausal women on balance and quality of life and to compare the results with a classic osteoporosis exercise program.

Materials and methods

This study was performed as an observational cohort study comprised of subject and control groups with outcome. Twenty-six postmenopausal osteoporotic women participating in a drug trial (FLINT-ACT) were included. The clinical study was performed in the Division of Osteoporosis at Istanbul University Cerrahpasa School of Medicine.

Inclusion criteria were as follows: female, ages 55 - 85, mobile, and T-score by DXA measurement below -2.5 in at least one region. Patients signed an informed consent prior to entry into the study.

Exclusion criteria were: systemic or psychiatric disorders and abnormal laboratory values. All patients were receiving risedronate 5 mg/day+1000 mg elementary calcium+active vitamin D metabolites 0.5 mcg/day according to the protocol of the FLINT-ACT study. Patients were randomly divided into two treatment groups:

I. Yoga group: This group consisted of 13 patients who received yoga education for 1 hour, twice a week, over 12-weeks. The yoga program involved hatha yoga, a type of yoga incorporating a combination of breathing and movement.

II. Exercise group: This group consisted of 13 patients who performed classic osteoporosis exercises for 1 hour, twice a week, over 12-weeks. Exercises included strengthening and stretching exercises of the abdominal, back, quadriceps and hamstring muscles, balance and posture exercises. While yoga group was trained by a professional yoga trainer, exercise group was supervised by the staff physiotherapist in our osteoporosis division.

The Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO) was used for the evaluation of the quality of life of the patients. QUALEFFO index has 41 questions total under the titles of Pain, Activities of Daily Living, Inside Activities, Mobility, Social Functions, General Health Perception and Mental Health Status. The scores of each section and the total score were evaluated.

A neuromuscular test battery, which is an indicator for the risk of falls in elderly women, was used for the evaluation of balance. These tests included one-leg stance, body sway and tandem walk.[7] Assessments were performed before and after in both groups. The pre- and post-treatment results of the two groups were compared.

TABLE I.—*Demographic data of patients.*

	Exercise group Mean (SS)	Yoga group Mean (SS)	P value
Age (year)	61.31 (8.43)	60.62 (8.54)	0.650
Age at menopause	47.08 (5.92)	45.08 (7.59)	0.247
Height (cm)	1.59 (0.044)	1.57 (0.004)	0.223
Weight (kg)	63.15 (7.85)	64.00 (10.97)	0.880
BMI	25.04 (3.28)	26.13 (4.83)	0.650

BMI: Body Mass Index.

Statistical analysis

In statistical evaluation, the Wilcoxon-Rank test was used for the comparison of the results within the groups. Mann Whitney-U and Fisher Exact tests were used for comparison between the groups.

Results

Demographic data of patients in both groups revealed that there were no significant differences between age, age of menopause, height, weight and Body Mass Index (BMI) (P>0.05) (Table I).

One-leg stance and QUALEFFO parameters were not significantly different between the two groups before the treatment. Only the general health assessment values (GHA) were found to be higher in the yoga group. Comparison following 12 weeks of treatment showed no significant difference between the two treatment groups in terms of one-leg stance indicating static balance (right and left foot), and parameters of QUALEFFO. There were significant improvements in only three parameters of QUALEFFO (pain, household activities and total score) in the exercise group, whereas all parameters of QUALEFFO were significantly improved in the yoga group at the end of 12-weeks. While there was no significant change in one-leg stance test in the exercise group, there was a significant improvement in the yoga group. Our results were summarized in Table II.

TABLE II.—*The mean changes in one-leg stance and QUALEFFO parameters with treatment in each groups separately and the comparison of yoga and exercise groups.*

	Exercise group		Yoga group					
One-leg stance	Pretreatment Mean	Post-treatment Mean	Pretreatment Mean	Post-treatment Mean	P^a value	P^b value	P^c value	P^d value
Left foot(sec)	11.79 (4.22)	12.79 (3.78)	11.36 (3.47)	14.18 (1.50)	0.173	0.012*	0.762	0.762
Right foot (sec)	10.92 (4.34)	11.85 (3.32)	13.00 (2.85)	13.85 (2.30)	0.231	0.027*	0.287	0.153
QUALEFFO								
Pain	12.15 (3.39)	9.62 (2.81)	11.92 (4.89)	8.62 (3.20)	0.005*	0.007*	0.880	0.336
Functional activity (daily living)	7.15 (2.41)	6.23 (2.20)	6.69 (1.44)	5.15 (0.90)	0.078	0.005*	0.650	0.311
Functional activity (household)	11.77 (3.24)	9.85 (4.16)	10.77 (5.04)	7.08 (2.90)	0.042*	0.003*	0.336	0.051
Mobility	14.23 (5.05)	12.77 (5.02)	15.08 (5.53)	11.77 (4.28)	0.088	0.002*	0.687	0.687
Social activities	16.77 (3.27)	15.62 (4.61)	19.38 (4.94)	17.62 (4.72)	0.108	0.027*	0.186	0.264
General Health Assessment	8.23 (2.09)	7.77 (2.52)	10.08 (2.06)	7.46 (1.61)	0.416	0.002*	0.034	0.920
Mental health	30.23 (3.90)	30.62 (5.92)	30.62 (5.92)	33.15 (3.16)	0.875	0.040*	0.880	0.223
Total	100.54 (12.53)	92.46 (14.09)	104.54 (15.43)	90.85 (12.00)	0.016*	0.002*	0.336	0.801

*P<0.05; [a]The mean changes with treatment in exercise group; [b]The mean changes with treatment in yoga group [c]Exercise versus yoga (pretreatment); [d]Exercise versus yoga (post-treatment).

Discussion

Osteoporotic fractures are among the most important causes of disability and mortality in postmenopausal women.

Although osteoporotic fractures may occur spontaneously, they usually result from falls. The frequency of falls is increased with age and it is linked with environmental factors only in a proportion of 44% as showed by Tinetti *et al.*[8] Falling can cause severe psychological problems, even though it may not result in a fracture. The fear of falling may decrease mobilization of the patients and limit their physical and social life. This has a negative effect on the quality of life.[9] The most important non-environmental risk factors of falls include decreased postural balance and muscle strength. The control of postural balance decreases with age, resulting in an increase in the frequency of falls.[10] Different exercise modalities including Tai Chi have been demonstrated to be effective on falling risk and quality of life.[11-15]

The neuromuscular test is a useful and simple method to assess the risk of falling.[7] Nevitt *et al.* reported that the shorter duration of the single-foot test and having more than eight faults in tandem walking may increase the risk of falling by at least two-fold.[15] The efficacy of yoga in the rehabilitation of postmenopausal osteoporosis has been showed in several studies.[4, 5] The maintaining of emotional stability, improvement in posture, balance, and coordination and increasing in body flexibility are major effects of yoga in postmenopausal osteoporosis.[17, 18]

Different indexes have been used for the evaluation of quality of life changes caused by osteoporosis.[19-21] QUALEFFO is a reliable and reputable index for postmenopausal osteoporosis; its reliability and validity for Turkey has been demonstrated previously.[22-24] QUALEFFO can evaluate the pain, physical activities (activities of daily living, inside activities and mobility), social activities, general health assessment and mental health.

In our study, the patients included in the classic exercise program demonstrated significant improvement for pain, inside activities and total QUALEFFO scores following treatment. Improvement in back pain was explained by the strengthening of back muscles, stretching and posture exercises. Other components of QUALEFFO also showed beneficial effects, but these were not statistically significant. The classical exercise program additionally was found to have positive effects on balance evaluated by neuromuscular tests, but these results were not significant either.

There was an improvement in all QUALEFFO parameters in the yoga group following the three-month program. Yoga has been shown to be effective on the one-leg stance test whereas no significant effect was found in tandem walking or body sway in our study.

Although the number of the patients is limited in our study, it can be stated that 12 weeks of yoga training had beneficial effects on the quality of life in postmenopausal osteoporosis. Studies with longer duration and larger numbers of patients would be able to demonstrate these effects more clearly. Furthermore, yoga training should be tested in osteoporotic subgroups (*i.e.* spinal fractures).

Conclusions

Although both yoga training and classical exercises have beneficial effects on balance and quality of life in postmenopausal osteoporotic women, yoga seems to be more effective than classical exercise. Yoga training could be considered to be an alternative activity to classic exercise in the rehabilitation of osteoporotic patients. However, since it is an observational study, our results primarily reflected our clinical practice. In general yoga courses can include only a limited number of patients, therefore multi-center studies are needed to reveal its efficacy in postmenopausal osteoporotic women.

References

1. Kai MC, Anderson M, Lau EM. Exercise interventions: defusing the world's osteoporosis time bomb. Bull World Health Organ 2003;81:827-30.
2. Karlsson M. Exercise increases muscle strength and probably prevents hip fractures. Lakartidningen 2002;29:3408-13.
3. Shea B, Bonaiuti D, Iovine R, Negrini S, Robinson V, Kemper HC et al. Cochrane Review on exercise for preventing and treating osteoporosis in postmenopausal women. Eur Med Phys 2004;40:199-209.
4. Go VL, Champaneria MC. The new world of medicine: prospecting for health. Nippon Naika Gakkai Zasshi 2002;20:159-63.
5. Kronenberg F, Fugh-Berman A. Complementary and alternative medicine for menopausal symptoms: a review of randomized, controlled trials. Ann Intern Med 2002;137:805-13.
6. Lavey R, Sherman T, Mueser KT, Osborne DD, Currier M, Wolfe R. The effects of yoga on mood in psychiatric inpatients. Psychiatr Rehabil J 2005;28:399-402.
7. Kerschan-Schindl K, Uher E, Grampp S, Kaider A, Ghanem AH, Fialka-Moser V *et al.* A neuromuscular test battery for osteoporotic women: a pilot study. Am J Phys Med Rehabil 2001;80:351-7.
8. Tinetti ME, Speechley M, Ginter SF.Risk factors for falls among elderly persons living in the community. N Engl J Med 1988;319:1701-7.
9. Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. J Gerontol 1994;49:M140-7.
10. Woollacott MH, Shumway-Cook A. Changes in posture control across the life span-a systems approach. Phys Ther 1990;70: 799-807.
11. Province MA, Hadley EC. The effects of exercise on falls in elderly patients. A preplanned meta-analysis of the FICSIT Trials. Frailty and Injuries: Cooperative Studies of Intervention Techniques. JAMA 1995;273:1341-7.
12. Papaioannou A, Adachi JD. Efficacy of home-based exercise for improving quality of life among elderly women with symptomatic osteoporosis-related vertebral fractures. Osteoporos Int 2003;14: 677-82.
13. Malmros B, Mortensen L, Jensen MB, Charles P. Positive effects of physiotherapy on chronic pain and performance in osteoporosis. Osteoporos Int 1998;8:215-21.
14. Preisinger E, Kerschan-Schindl K, Wöber C, Kollmitzer J, Ebenbichler G, Hamwi A *et al.* The effect of calisthenic home exercises on postmenopausal fractures-a long-term observational study. Maturitas 2001;40:61-7.
15. Cakar E, Dincer U, Kiralp MZ, Cakar DB, Durmus O, Kilac H *et al.* Jumping combined exercise programs reduce fall risk and improve balance and life quality of elderly people who live in a long term care facility. Eur J Phys Rehabil Med 2009;10 [Epub of ahead of print].
16. Nevitt MC, Cummings SR, Kidd S, Black D. Risk factors for recurrent nonsyncopal falls. A prospective study. JAMA 1989;261: 2663-8.
17. Blumenthal JA, Emery CF, Madden DJ, George LK, Coleman RE, Riddle MW *et al.* Cardiovascular and behavioral effects of aerobic exercise training in healthy older men and women. J Gerontol 1989;44:147-57.
18. Carlson LE, Speca M, Patel KD, Goodey E. Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress, and immune parameters in breast and prostate cancer outpatients. Psychosom Med 2003;65:571-81.
19. Morris R, Masud T. Measuring quality of life in osteoporosis. Age and Ageing 2001;30:371-3.
20. Silverman SL, Cranney A. Quality of life measurement in osteoporosis. J Rheumatol 1997;24:1218-21.
21. Kessenich CR, Guyatt GH, Rosen CJ. Health related quality of life and participation in osteoporosis clinical trials. Calcif Tissue Int 1998;62:189-92.
22. Lips P, Cooper C, Agnusdei D, Caulin F, Egger P, Johnell O *et al.* Quality of life in patients with vertebral fractures: validation of the Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO). Working Party for Quality of Life of the European Foundation for Osteoporosis. Osteoporos Int 1999;10:150-60.
23. Oleksik A, Lips P, Dawson A, Minshall ME, Shen W, Cooper C *et al.* Health-related quality of life in postmenopausal women with low BMD with or without prevalent vertebral fractures. J Bone Miner Res 2000;15:1384-92.
24. Kocyigit H, Gulseren S, Erol A, Hizli N, Memis A. The reliability and validity of the Turkish version of Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO). Clin Rheumatol 2003;22:18-23.