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Efficacy of Yoga and Medical Treatment in Post-Menopausal Osteoporosis

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Abstract: Osteocalcin is a bone specific protein and is considered as an important marker in bone turn-over. The purpose of the study was to verify in post-menopausal women, the effect of yoga and medical treatment on osteocalcin. 45 post-menopausal women [59.6±5.9 years] are divided into 2 groups: yoga group [n = 20] and medical treatment group [n = 25]. Yoga and medical treatment were given for 3 months and pre- and post- serum osteocalcin levels were measured by ELISA using microplate ELISA kits. Statistical analysis was done using paired't' and unpaired 't' test and mean serum osteocalcin level before and after yoga were 31.82±6.48 and 20.46±10.15 with a p-value < 0.05 and mean serum osteocalcin levels before and after medical treatment were 33.49±3.24 and 21.70±7.56 with a p-value of < 0.05. Serum osteocalcin levels were found to be increased osteoporosis and were significantly decreased after yoga and medical treatment. But comparing the post serum osteocalcin levels between yoga and medical treatment have an insignificant difference. Hence yoga and medical treatment can be used in combination for management of osteoporosis in post-menopausal women.
Keywords: Osteocalcin, osteoporosis, yoga, post-menopausal women

INTRODUCTION

Menopause is associated with incidence of several chronic diseases, including osteoporosis, cardiovascular disease, and obesity. It is anticipated that over 50% of global osteoporotic hip fracture will occur in Asia by 2050[1]. Osteoporosis is a progressive systemic skeletal disorder characterize by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increased in bone fragility and susceptibility to fracture. This is a disease that may have a tremendous impact on the lives of many post-menopausal women. World- wide, the life time risk for women to have an osteoporotic fracture is 30-40%. Menopause and aging is associated with accelerated loss of cortical bone. Bone loss occurs when the balance between formation and resorption is upset and resorption is excessive in a negative remodelling balance [2].

Osteocalcin, also known as bone gamma carboxy - glutamatic acid containing protein [BGLAP], is secreted by osteoblasts during bone formation phase of bone remodelling. In osteoporosis, generally there is a deficiency of calcium and phosphorus level, and since osteocalcin is a calcium dependant bio-marker and has a strong affinity with bone matrix [hydroxyapatite] responsible for mineralization of bone. Osteoporosis leads to decrease hydroxyapatite crystals formation and hence increase in serum osteocalcin levels [3].

Yoga is a physical activity consisting of isometric movements that includes breathing exercise and meditation. It has been reported that this type of exercise is effective in improving functions and reducing low back pain. It has been previously reported that yoga intervention failed to induce significant improvement in post-menopausal women BMD [4], it would be interesting to examine the effects of serum osteocalcin level in post-menopausal women by yoga therapy.

MATERIALS & METHODS

The present study was conducted in the department of Physiology Regional Institute of Medical Sciences in collaboration with department of Orthopaedics Jawaharlal Nehru Institute of Medical Sciences, Imphal, Manipur. The study group included 45 post-menopausal women in the age group of 45 – 75

years and diagnosed as osteoporosis by clinicians based on clinical feature and radiological evidence. 20 patients [group 1] were allowed to perform only yoga daily for an hour for minimum 3 months as treatment, 25 patients [group 2] were given medical treatment with bisphosphonates.

Women with recent fractures, osteoarthritis, previously diagnosed osteoporosis, uncontrolled hypertension, smoking, and morbid obesity [BMI ≥ 40 kg/m^2] were excluded from the study. After obtaining written consent, samples of serum osteocalcin were collected at the time of diagnosis and after 3 months of yoga performance and medical treatment. Serum osteocalcin were measured by ELISA technique [Automated microplate reader – ERBA Lisa scan ™ EM, 2011] and osteocalcin microplate ELISA kit [Model No. MBS 494060], with normal reading of 3 – 30 ng/ml.

Statistical analysis

All the data were collected and analyzed with paired 't' test, unpaired 't' test, used in SPSS version 21 [IBM SPSS Statistics 21]

RESULTS

Descriptive data of both groups shows a mean age of 59 years. Table 1 shows the number of patients with normal and abnormal serum osteocalcin level before and after interventions. Table 2 shows comparison of mean serum osteocalcin levels in yoga and medical treatment at the time of diagnosis and after treatment. Table 3 shows comparison of post therapy serum osteocalcin levels in yoga and medical treatment.

Table-1: Number of patients with normal and abnormal serum osteocalcin level before and after interventions.

	NUMBER OF PATIENTS			
	BEFORE TREATMENT		AFTER TREATMENT	
METHODS OF TREATMENT	NORMAL	ABNORMAL	NORMAL	ABNORMAL
YOGA	5	15	17	3
MEDICAL	0	25	24	1

Table-2: Comparison of mean serum osteocalcin levels in yoga and medical treatment at the time of diagnosis and after treatment.

	YOGA [n=20]			MEDICAL [n=25]		
VARIABLE	Before	After	p value	Before	After	p value
Serum osteocalcin [ng/ml]	31.82 ± 6.48	20.46 ± 10.15	0.00	33.49 ± 3.29	21.70 ± 7.56	0.01

*Values are mean ± SD. Significant difference between before and after each mode of treatment [$p < 0.05$]

Table-3: Comparison of post therapy serum osteocalcin levels in yoga and medical treatment.

	YOGA [n=20]	MEDICAL [n=25]	
VARIABLE	Post therapy	Post therapy	p value
Serum osteocalcin [ng/ml]	20.46 ± 10.15	21.70 ± 7.56	0.219

*Values are mean ± SD. Significant difference between pre- and post- therapy [$p < 0.05$]

DISCUSSION

Table 1 shows the number of patients who have reduced serum osteocalcin levels after yoga and medical treatment, so as table 2 which shows the mean serum osteocalcin levels reduction, significantly, by both mode of treatment. Previous studies have shown that serum osteocalcin levels have significantly reduced after 6 months of yoga treatment[5]. In a study they have shown yoga & pranayam may prevent and delay osteoporosis with a significant decrease in bone mineral density [5].

Also Nayoung Ahn and Kijin Kim showed a similar result with 12 weeks exercise training in osteoporotic patients significantly reduced inflammatory marker levels [6]. Similarly M Beg, N Akhtar *et al*., showed that the serum osteocalcin levels were reduced significantly in post-menopausal osteoporotic patients after bisphosphonate therapy [7]. Also Vanita RJ, Jayshri V *et al*., showed significant reduction in serum osteocalcin levels in post-menopausal osteoporotic womens after medical treatment [2].

Table 3 showed that there is no significant difference in the mean of serum osteocalcin levels with post medical and yoga treatment and yoga cannot be individually used as a mode of treatment for osteoporosis as they failed to reduce the BMD levels post yoga treatment in post-menopausal women [4].

CONCLUSION

Yoga and medical treatment has shown a significant reduction in serum osteocalcin level after comparing for 3 months. However, in comparison, there is no significant difference between yoga and medical

treatment. These findings suggest that, yoga alone cannot be used as a mode of treatment for osteoporosis but combined with medical treatment will yield better results. Further studies and further test like BMD, CTX are required to confirm this hypothesis.

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