LE

Effects of yoga on natural killer cell counts in early breast cancer patients undergoing conventional treatment

Comment to:

Recreational music-making modulates natural killer cell activity, cytokines, and mood states in corporate employees
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Dear Editor,

Recreational music-making (RMM) was evaluated as a stress-alleviating strategy in Japanese corporate male employees and was compared to leisure reading as a control [1]. Following a single session of RMM, the volunteers showed enhanced mood, lower gene expression levels of the stress-induced cytokine interleukin-10, and higher natural killer (NK) cell activity. The increase in NK cell activity was especially seen in individuals who had low levels prior to intervention. These changes were attributed to the stress-alleviating effects of RMM.

It was interesting to note that the benefits were noted after a single session of RMM. Similarly, practicing yoga has also been shown to reduce subjectively rated occupational stress levels as well as psychophysiological signs of stress following a short, two-day training program [2].

A randomized controlled trial assessed the effect of a yoga program on NK cell counts in breast cancer patients undergoing conventional cancer treatment (i.e., surgery followed by radiotherapy and chemotherapy). The study had the approval of the institutional review board and the patients gave their consent to participate in the trial. Thirty-seven women with recently diagnosed stage II and III operable breast cancer were randomized to receive yoga (n=16; mean age ±S.D, 47.0±7.6 years) or supportive therapy (n=21; mean age ±S.D, 49.8±12.9 years) before primary surgery. None of them had any secondary malignancy, recent infections, or other medical conditions which would have influenced the outcome of the interventions or the assessments. The age (±1 year), stage of disease, grade, and lymph node status were similar in the yoga and supportive therapy (control) groups.

Blood samples were collected between 8 a.m. and 12 p.m. to reduce diurnal variation. A baseline assessment was done prior to surgery. Follow-up assessments were done at 4 weeks following the baseline assessment (i.e., after surgery), 10 weeks from baseline (i.e., after radiotherapy), and 32 weeks from baseline (i.e., after 6 cycles of chemotherapy). Peripheral blood lymphocytes were characterized for NK cell subsets using immunohistochemistry (Alkaline Phosphatase Anti-Alkaline Phosphatase technique). The cells were counted per two hundred fields and the mean percentage of CD56 positive cells per hundred fields was extrapolated.

The yoga group received a program which included different yoga techniques while the control group received supportive counseling sessions. The yoga program consisted of postures practiced with awareness (*asanas,* for 15 minutes), voluntarily regulated yoga breathing (*pranayama,* for 15 minutes), and relaxation while supine (*shavasana* or the corpse posture) combined with imagery (30 minutes). The supportive counseling sessions increased the patients' knowledge about the disease and treatment options, thereby reducing their apprehensions and anxiety. The patients had four yoga sessions in the period before and after surgery and had three yoga sessions per week during their adjuvant radiotherapy treatment with self-practice at home on the remaining days. During chemotherapy, patients had a yoga session on the same day as chemotherapy, which was once in twenty-one days and had an additional yoga session once in ten days. The instructor monitored their practice at home everyday by telephone calls and house visits. Participants were also requested to maintain a daily diary listing the yoga practices done, duration of practice, experience of distressful symptoms, intake of medication and their diet. The control intervention consisted of brief supportive therapy with education that is routinely offered to patients as a part of their care in the center. This control intervention was chosen to control for factors such as attention and support from contact with the instructor. Patients and their relatives underwent counseling by a trained social worker once in 10 days, as 15 minute sessions during their hospital visits for adjuvant radiotherapy and chemotherapy. Patients in the supportive therapy group also completed daily diaries on treatment related symptoms, medication and their diet during chemotherapy. Data were analyzed using a repeated measures

analysis of variance and *post-hoc* analyses with Bonferroni adjustment.

There was a significant decrease in the NK cell percentage in the control group from baseline/pre-surgery (22.0±4.2) to post-surgery (16.8±3.7; $p<0.05$) and from pre-surgery (22.0±4.2) to post-chemotherapy (13.8±3.2; $p<0.001$). In contrast, the NK cell percentage did not significantly decrease in the yoga group, at corresponding time points [i.e., baseline/pre-surgery (20.1±6.5) to post-surgery (19.8±5.8); and from pre-surgery (20.1±6.5) to post-chemotherapy (16.9±3.2)]. The NK cell percentage was higher in the yoga group (16.9±3.2) post-chemotherapy compared to the control group (13.8±3.2; $p<0.05$). However, there were no significant differences between groups following surgery and radiotherapy.

These findings are consistent with those of other, non-yoga stress reduction interventions [3]. Also, an earlier study showed an increase in NK cell counts after 24 weeks of yoga voluntarily regulated rhythmic breathing (*sudarashan kriya yoga* and *pranayama)* in patients with cancer [4].

Decrements in NK cell counts have been found to be an important predictor for survival in advanced breast cancer patients. The present results suggest that practicing yoga helped to reduce immune suppression associated with chemotherapy in early breast cancer patients. Catecholamines and glucocorticoids have been shown to rapidly and markedly affect the dynamics and distribution of NK cells in the spleen. liver, lungs, circulating blood, and marginating pool of blood [5,6]. It may be hypothesized that changes in these hormone levels following yoga [7], could be one of the ways in which yoga practice influences NK cell levels.

Sincerely,
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REFERENCES:

1. Wachi M, Koyama M, Utsuyama M et al: Recreational music-making modulates natural killer cell activity, cytokines, and mood states in corporate employees. Med Sci Monit, 2007; 13(2): CR57–70
2. Vempati RP, Telles S: Baseline occupational stress levels and physiological responses to a two day stress management program. J Indian Psychol, 2000; 18(1 & 2): 33–37
3. Carlson LE, Speca M, Patel KD et al: 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
4. Kochupillai V, Kumar P, Singh D et al: Effect of rhythmic breathing (Sudarshan Kriya and Pranayam) on immune functions and tobacco addiction. Ann NY Acad Sci, 2005; 1056: 242–52
5. Dhabhar FS, Miller AH, McEwen BS et al: Effects of stress on immune cell distribution. Dynamics and hormonal mechanisms. J Immunol, 1995; 154: 5511–27
6. Brosschot JF, Benschop RJ, Godaert GL et al: Effects of experimental psychological stress on distribution and function of peripheral blood cells. Psychosom Med, 1992; 54: 394–406
7. Granath J, Ingvarsson S, von Thiele U et al: Stress management: a randomized study of cognitive behavioural therapy and yoga. Cogn Behav Ther, 2006; 35(1): 3–10

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