

Short Communication

Psycho-biological correlation of yoga exercise in young Iranian women

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Yoga is considered as stress-reduction training. A case-control cohort study was designed to investigate the effects of yoga training on stress and plasma levels of cortisol in young (20 to 35 years) Iranian women. For experimental group, women (n=15) were recruited after their consent from a yoga training center in Isfahan (Iran) to participate in a twice weekly 90 min classes of yoga exercises for a period of three months. The same number of age matched voluntary women who had no experience in yoga or similar training also participated in the study as control group. Cooper-Smith stress test score and plasma cortisol levels were examined in both groups at the beginning and the end of the yoga training period. The results of this study indicated that yoga training reduced both stress and plasma cortisol levels significantly. It is concluded that yoga has beneficial effects on mentally distressed individuals.

Key words: Yoga, meditation, asana, stress, cortisol.

INTRODUCTION

The word 'yoga' means 'yoke' or 'union' which means the integration of mind, body, and spirit. Yoga is known as an ancient holistic Indian exercise that consisted of body movements (asana), deep breathing (prana) and meditation (Desikachar, 1999; Khalsa et al., 2006). Psychological and physiological studies have shown that yoga exercise reduces sympathetic activity and promotes the flexibility of the autonomic nervous system (Vempati et al., 2002; Malik et al., 2011). Several lines of evidence have indicated that yoga exercise reduces stress and modulates functions of the hypothalamic pituitary adrenal axis by influencing cortisol secretion (MacLean et al., 1994; West et al., 2004; Capaldi et al., 2005; Wright et al., 2007; Simpsom et al., 2008). Despite these evidences, it has been reported that yoga training might improve some psychological parameters but the cortisol levels remain unchanged (Schell et al., 1994). These controversies led us to investigate the psycho-biological correlation of yoga exercise in Iranian women.

METHODOLOGY

This case-control study was undertaken between February and September 2009, in Isfahan-Iran. Informed consent was obtained from study participants (n=15) which were women aged from 20 to 35 years (30.55 ± 4.53). This was followed by measurement of their stress using Cooper-Smith questionnaire. The women in the study group (n=15) from a yoga training center in Isfahan, Iran scored high in the Cooper-Smith stress questionnaire. The exact age and sex matched those of the women of the control group (n=15) who had never undergone any kind of yoga practice; as such, they stayed behind in the same center to rest for the same proportion of time until the end of the program. A single morning blood sample (around 8 O'clock in the morning) was taken from each participant at the beginning of the study and serum cortisol concentrations were measured by RIA kit (Origenetic-Diagnostica, GMBH-Germany) by using the kit protocol.

Women in the experimental group participated in a twice weekly 90 min classes of yoga exercises, consisting of structured classic postures (asana), along with breathing exercises (pranayama), meditation and relaxation - techniques like shavasana and yoga nidra (yogic conscious sleep), for a period of 3 months.

After the period of yoga exercise, the women in the two groups were evaluated again by both hormonal assessment and the Cooper-Smith stress test. Obtained data as mean \pm SD of serum cortisol levels and the stress test scores in the experimental and control groups, were compared before and after yoga exercise.

The data was analyzed using SPSS version 17. Data related to

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Table 1. The effect of yoga exercise on stress and plasma cortisol levels in women.

Experience	Cooper Smith (test score)	Serum cortisol level ($\mu\text{g}/100\text{ ml}$)
Control group pre-test	23.8 \pm 7.2	30.54 \pm 3.0
Yoga group pre-test	26.4 \pm 7.4	30.1 \pm 2.5
Control group post test	24.8 \pm 8.0	29.8 \pm 4.1
Yoga group post test	18.9 \pm 5.7*	22.1 \pm 2.3*

Cooper Smith stress test (scores \pm SD) and plasma cortisol levels ($\mu\text{g}/100\text{ ml} \pm$ SD) before and after yoga exercise from the 2 study groups were compared by paired t-test and ANOVA test. *Post test experimental group was significantly different to that of other groups ($p < 0.05$).

control and experimental groups were compared using paired t-test and ANOVA test, and p - value < 0.05 was considered statistically significant.

RESULTS

In the 2 study groups, consisting of cases ($n=15$) and controls ($n=15$), the mean age was 30.55 ± 4.53 . The data indicating the effects of yoga exercise on the control and experiment groups is summarized in Table 1. Cooper Smith test scores for the two groups were 23.8 ± 7.2 and 26.4 ± 7.4 respectively. When the test was performed, after the period of the program for the control group, the score was 24.8 ± 7.0 . The observed differences were not statistically significant. However, after a 3 month yoga exercise, the scores of the experimental group reduced to 18.9 ± 5.7 , which were significantly different as compared to the post-test control group (< 0.05). As shown in Table 1, the levels of plasma cortisol in the pre-test groups and post-test control group are approximately similar and the differences are not statistically significant, whereas, a marked reduction in plasma cortisol levels was observed in the samples taken from experimental group which was significantly different from that of other groups (< 0.05).

DISCUSSION

The results of this interventional case-control cohort study indicate that 3 months yoga exercise was effective in reducing both the score of stress and serum cortisol in the experimental group significantly. The result of this study is in accord with the results of previous reports, which evaluated the effects of yoga training on stress and salivary cortisol levels (West et al., 2004; Capaldi et al., 2005; Wright et al., 2007; Simpsons et al., 2008). These studies confirm the usefulness of yoga as a complementary treatment method in psychological disorders (Gupta et al., 2006; Khalsa, 2004; Ramaratnam et al., 2000). However, this is inconsistent with another study by Schell et al. (1994) which indicates that yoga exercise lowers stress but not cortisol in healthy women. It has been shown that healthy women showed little effect on plasma cortisol, whereas these exercise lowered the

base levels of the stress (Schell et al., 1994). Since psychological well-being is linked to the function of hypothalamic-pituitary-adrenal axis (MacLean et al., 1994), it appears that although yoga exercise promotes relaxation, it has little effect on cortisol levels of healthy women without stress. Furthermore, the differences between the mentioned studies with the current study however, may be due either to the distinct features of different yoga styles, which differ in terms of intensity and specificity of the exercises, and the duration of the intervention or psychological differences of the individuals who participated in these studies. In addition, the results may differ due to source of cortisol (saliva vs. plasma) as well as the diurnal variation of cortisol levels (West et al., 2004; Simpsons et al., 2008).

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