

The effect of yoga exercise on secretion of cortisol in women

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Abstract

Yoga has often been perceived as a method of stress management tool that can assist in alleviating depression and anxiety disorders. The objective of this research was to study the effect of yoga on secretion of cortisol in women. In this research which was semi-empirical, 30 women with the average age of 19 to 30 years selected, and divided into one group of 15 subjects; For experimental group, women (n=15) were recruited after their consent from a yoga training center in Ankara (Turkey) 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. Plasma cortisol levels were examined in both groups at the beginning and the end of the yoga training period. Results were assessed at significance level of $p < 0.05$ and using t-test for dependent samples. The results of this study indicated that yoga training reduced plasma cortisol levels significantly. It is concluded that yoga has beneficial effects on mentally distressed individuals.

Key words: Yoga exercise, Cortisol, Women.

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; Simptom et al., 2008). Today, yoga has evolved almost as an alternative system of medicine. More and more people are learning and doing it regularly. By practicing yoga systematically they have gained a lot. Moreover it is not costly and has no side effects. On the contrary, many of the allopathic medicines like strong antibiotics, pain killers are very costly and have innumerable side effects. Large numbers of Americans and Europeans have recently adopted the practice of yoga for its proposed health benefits. By 1998, an estimated fifteen million, mostly female American adults, had used yoga at least once in their life time and 7.4 million reported practicing yoga during the previous year (Saper et al., 2004). Featured in the lay press yoga continues to be marketed as a method to empower well-being and to reduce stress ("Power-Yoga"). Indeed, some health professionals refer their patients to Yoga teachers for help in managing variety of stress-related ailments. Yoga has often been perceived as a method of stress management tool that can assist in alleviating depression and anxiety disorders (Signet Market Research, 2000). "Cortisol plays a crucial role in a person's response to stress," explains Justin Mager, the first author on the study. "We wanted to test if yoga can impact the levels of cortisol in a person's body, potentially helping to reduce stress." Adrenal gland is an endocrine gland which releases cortisol when affected by its stimulating

hormone, that is, adrenal corticosteroid. This hormone profoundly affects stress, carbohydrate, fat, and protein metabolisms and has stimulating effect on central nervous system, circulatory system and inflammation (Gayton, 2005). Cortisol (stress hormone) is one of the body's hormone that secreted by the adrenal glands. It has been shown that high levels of cortisol in the bloodstream (as occurs in chronic stress) have a negative impact. Yoga helps to keep down the level of Cortisol and control of stress. There have been various studies regarding the effect of yoga on stress. Kiger (2000) showed that yoga exercises have anti-depression and anti-anxiety effects. Also, (Michalsen et al., 2005) in another research showed that women suffering from mental distress participating in a 3-month Iyengar yoga class show significant improvements on measures of stress and psychological outcomes. Further investigation of yoga with respect to prevention and treatment of stress-related disease and of underlying mechanism is warranted. In a published study, which was conducted at California State University in Los Angeles proved that yoga exercises help to increase bone density in the spine. Yoga decreases the cortisol (stress-producing hormone) which helps to keep calcium in the bones. In the United States of America a Study was performed with effects of Concentration, meditation and yoga on student's anxiety. The results showed that yoga has had significant effect on reduce stress (Taylor, 1977). There have been different studies regarding responses to stress and cortisol secretion with contradictory results. In many of these researches it is shown that increase in the intensity of exercises leads to more secretion of cortisol and that concentration of cortisol decreases in sports exercises with moderate intensity and short duration (Silva, et al., 1984). some researchers have studied cortisol secretion and concentration in athletes involved in running activity with a pressure more than 50% of VO₂ max (maximal oxygen consumption) and observed that after performing these exercises, secretion of cortisol, anxiety and stress significantly increased (Salmon, 2001).

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 effect of yoga exercise on secretion of cortisol in women.

Material and Methods

The present research is semi-empirical and participants (n=30) which were women aged from 20 to 30 years from Ankara in Turkey. Subjects' characteristics are presented in Table 1. A week before the main test, subjects' height, weight, and body mass index were measured in both groups. Women randomly divided two groups. Experimental group (n=15) and control group (n=15). Both groups pre-test initial sampling was conducted at eight o'clock in the morning. The control group (n=15) who had never undergone any kind of yoga practice. Women in the experimental group participated in two 90-minute yoga classes per week throughout the next 3 months. Second blood samples were collected from both groups after training (around 8 O'clock in the morning). Cortisol was measured by Monobind Company Kate, model number (eia-36 kb 2) made in U.S.A. Statistical analysis was performed using SPSS version 18. Data normality was investigated using Kolmogorov – Smirnov test. Paired t-test was used for within- group comparison and independent t-test was used for between groups comparison. The significance level of the test was considered $p \leq 0.05$.

Table 1: Participant Characteristics

Parameter	experimental training	Control group
Age (year)	24.15±1.62	24.00±1.51
Height (cm)	161.10±9.85	160.40±7.64
Body weight (kg)	55.40±7.64	55.90±8.37
Body Mass Index (kg/m ²)	18.74±2.29	18.90±2.44

Results

Within group variable comparison is presented in table 2. Results showed a decrease in cortisol levels ($p=0.003$), however, no Significant changes were observed in research variable in control group after eight weeks. Table 3 reports the comparison between measured means of experimental and control groups. The results showed significant differences in cortisol and between the two groups ($p=0.032$).

Table 2: Comparison of before (pre) and after (post) Intervention Values of Measured Variable.

Parameter	Phase	experimental group	P value	Control group	P value
Cortisol (mg/dl)	Pre	11.06±2.36	0.003	12.12±2.72	NS
	post	7.84±1.76		12.53±3.27	

Table 3: Comparison of Changes in Measured Variable during 8 Week in Two Groups (Means ± SD.)

Parameter	experimental group	Control group	P value
Cortisol (mg/dl)	7.81±1.36	12.43±3.17	0.032

Discussion and Conclusion

The present study was designed to investigate the effect of yoga exercise on secretion of cortisol in women in Ankara. Research findings showed that cortisol levels reduced at post-test compared to pre-test in experimental group and this reduction was statistically significant. Also no significant differences were observed in cortisol levels in control group at post-test compared to pre-test. Khaledan et al (2002) in a study investigated the effect of strength and endurance training programs on cortisol levels in young male athletes. A significant decrease in cortisol levels was observed. These results are consistent with those of experimental group, but are inconsistent with the results observed in control group. Usui et al (2011) in a study investigated the effects of prolonged strenuous exercise on cortisol levels in young men and observed a significant increase. These results are inconsistent with those obtained from experimental group but are consistent with the results obtained from the control group. Cortisol hormone is one of the most important hormones and indicators of stress and is released from cortical portion of adrenal gland in response to the pressures on physical and psychological mechanisms and strengthens the effect of catecholamine. One of the most important factors that trigger the secretion of this hormone is strenuous physical activity (Ebrahimpour et al., 2008).

Yoga is known as a stimulator of the endocrine system. Hormonal sensitivity to exercise depends on several factors, including intensity, duration, and type of exercise and how to train people (Bagheri et al., 2010). Probably duration in training program and type of subjects' training in this research resulted in reduced serum cortisol. So it was expected that yoga exercises increase cortisol levels and subsequently result in increased catabolism process in muscles to provide immediate body requirements. In all of all Yoga seems to offer considerable promise for women who suffer from mental distress, further merits research with respect to prevention and treatment of stress-related disease.

Limitations of this study include the lack of control on subject's genetic factors, weight, BMI, nutrition, sleep and psychological states.

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