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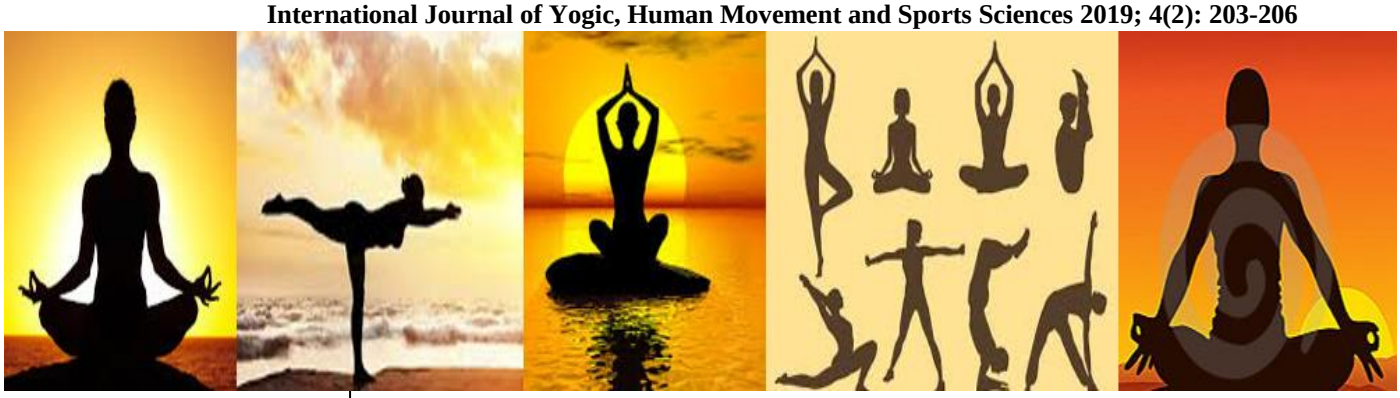

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Effect of asanas and pranayama on selected hormonal variables among polycystic ovary syndrome

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Abstract
The purpose of the study was to find out the effect of asanas and pranayama on selected hormonal variables among polycystic ovary syndrome. To achieve this purpose 45 polycystic ovary syndrome women were randomly selected from Trichy district, Tamil Nadu and their age ranged between 25-35 years. They were divided in to three equal groups, namely Experimental Group I (Asanas), Experimental Group II (Pranayama) and Control Group. The training period was 12 weeks and 6 days per week. No treatment was given to control group and kept separate. Hormonal variables such as fasting insulin and estrogen were selected as dependent variables. The pre and post test was conducted before and after the treatment respectively. The ANCOVA was used to find out the significant difference between the groups. If the result was significant Scheffe's post hoc test was used to find out the paired mean differences. The 0.05 level of confidence was fixed to find out the significant level. It was concluded that effect of asanas and pranayama improves the hormonal variables such as fasting insulin and estrogen.

Keywords: Asanas, pranayama, fasting insulin and estrogen

Introduction
Polycystic ovary syndrome (PCOS) is a complex heterogeneous endocrine disorder. It is a common disorder affecting 4-12% of women of reproductive age (Sheehan, 2004; Azziz, *et al*. 2004) [14, 3]. PCOS was first described in the United States in 1935 (Stein and Leventhal, 1935) [15]. PCOS is characterized by chronic anovulation and hyper androgenism in the absence of underlying adrenal or pituitary disease. Women with PCOS may complain about variable clinical manifestations including oligomenorrhea, hirsutism, acne, and infertility (Ehrmann, 2005) [8]. Approximately 75% of these women suffer from infertility due to anovulation.
Therefore, it is the most common cause of anovulatory infertility (Adams, Polson and Franks, 1986; Hull, 1987) [1, 11]. PCOS is also reported to be associated with obesity, insulin resistance and type II diabetes, dyslipidemia, hypertension, cardiovascular disease and endometrial carcinoma (Carmina and Lobo, 1999) [4]. Approximately 50-60% of women with the syndrome are overweight or obese compared to 30% of women in the general population (McKittrick; Flegal, *et al*. 2002) [9].
Treatment of PCOS must focus both on normalizing short-term signs of hyperandrogenism and anovulation and on reducing metabolic complications. This can be achieved through pharmacological intervention or preferably lifestyle modification (Norman, *et al*. 2002) **[13].** The most preferred and effective method of treatment of PCOS is lifestyle modification. Weight loss is an important treatment strategy.
Weight loss improves practically every parameter of PCOS. In obese, anovulatory PCOS women, weight loss restores ovulation and pregnancy rates, decreases insulin levels, diminishes acanthosis nigricans, lowers estrogen levels while raising sex hormone binding globulin (SHBG) levels, and improves psychological considerations (Clark, *et al*. 1995; Apter, 1998) [5, 2].
As women with PCOS age, the presence of these risk factors increases their risk for heart disease. At menopause, women experience a decline in estrogen. That decline may be correlated to a reduced libido. Some findings indicate that estrogen replacement therapy may benefit sexual function in certain perimenopausal and postmenopausal women. Estrogen replacement is unadvised in women with breast or uterine cancer.

It also may increase the chances of cardiovascular disease or liver disease.

Obesity is associated with an increase in insulin resistance (IR) and hyperinsulinemia. IR can be characterized as impaired action of insulin in the uptake and metabolism of glucose. Impaired insulin action leads to elevated insulin levels. Insulin synergizes with abnormally high secretion of luteinizing hormone (perhaps induced by hyperinsulinemia) to promote excess androgen production by intraovarian theca cells and an arrest of follicular development resulting in chronic anovulation (Steven Lindheim and Leah Whigham, 2012) [16].

In addition, hyperinsulinemia causes a decrease in hepatic sex hormone binding globulin, resulting in free circulating androgens and, thus, hirsutism and acne issues. While this picture tends to be more pronounced in women who have PCOS and are obese, it is important to realize that a nonobese patient with PCOS also may have IR, which suggests that insulin plays a major role in the pathogenesis of this disease (Speroff and Fritz, 2005 & Nestler, 2008) [18, 19].

Despite the potential beneficial effects of exercise in PCOS, there are no systematic reviews that evaluate the independent effects of exercise on cardiovascular and reproductive outcomes. Two recent non-systematic exercise-specific reviews highlight the gaps in knowledge around exercise type and intensity required to improve outcomes in PCOS (Hoeger, 2008; Thomson *et al*. 2010) [10, 17]. Consideration of the frequency and duration of exercise, as well as an assessment of sustainability, is also needed to determine the role of exercise in PCOS.

To our knowledge is to evaluate the prevalence of PCOS in women. Our main objective was to estimate the hormonal variables of PCOS in physically active women and to determine the effect of asanas and pranayama.

Statement of the Problem

To find out the effect of asanas and pranayama on selected hormonal variables among polycystic ovary syndrome.

Methods and Materials

A total of 45 women with polycystic ovary syndrome were selected at random from Trichy District, Tamil Nadu and their age ranged between 25-35 years and they were divided in to three groups consisting of fifteen subjects namely Experimental Group I, Experimental Group II and Control Group. Experimental group I underwent asanas, experimental group II underwent pranayama for a period of 12 weeks and 6 days per week. No treatment was given to control group and kept separate. Hormonal variables such as fasting insulin and estrogen were selected as the dependent variables. The study was formulated true random group design, consisting of a pre-test and post-test. The data were collected before and after the treatment respectively. The pre-test and post-test scores were collected and the obtained data were subjected to statistical treatment using analysis of covariance (ANCOVA). If the adjusted post-test result was significant, the Scheffe's post hoc test was used to determine the significance of the paired mean differences. In all cases the level of significance at 0.05 level of confidence was fixed as appropriate.

Results and Discussion on Fasting Insulin

Table I: Computation of Analysis of Covariance on Fasting Insulin (Scores in mg/dl)

Means	Exp Group I	Exp Group II	Control Group	SV	SS	df	MS	Obtained 'F'
Pre test	97.33	97.47	99.33	B	37.51	2	18.76	0.93
				W	844.40	42	20.10	
Post test	85.93	90.80	97.60	B	1030.18	2	515.09	19.30*
				W	1120.93	42	26.69	
Adjusted post test	86.56	91.31	96.47	B	711.64	2	355.82	30.96*
				W	471.14	41	11.49	

*Significant at 0.05 level. Table value required for significance at 0.05 level for *df* 2 and 42 is 3.22 and *df* 2 and 41 is 3.23.

Table II: Computation of Scheffe's Post Hoc Test of Fasting Insulin (Scores in mg/dl)

Control Group	Exp Group I	Exp Group II	MD	CI
96.47	86.56	-	9.91*	3.15
96.47	-	91.31	5.16*	3.15
-	86.56	91.31	4.75*	3.15

*Significant at 0.05 level of confidence

Discussion on Fasting Insulin

The table I showed pre, post and adjusted post test mean obtained F value 0.93, 19.30 and 30.96 respectively. This result clearly indicated that the effect of asanas and pranayama significantly decreased the insulin level among women with polycystic ovary syndrome in post and adjusted post test. Scheffe's Post Hoc test was given in the table II indicated that the ordered adjusted final mean difference between groups.

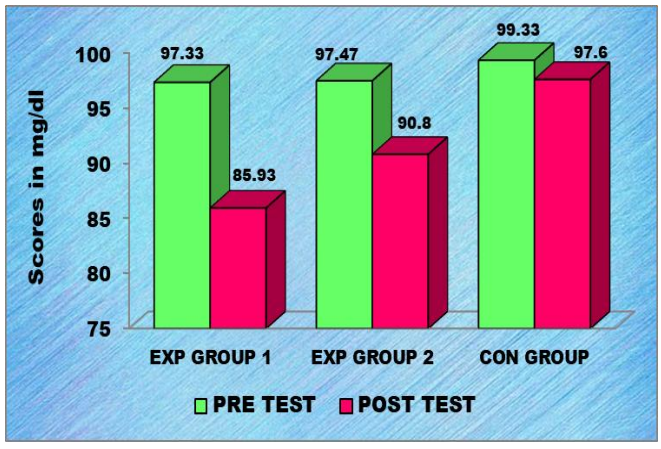

Fig 1: Bar Diagram Showing the Pre and Post Test Means of Fasting Insulin (Scores in mg/dl)

Results and Discussion on Estrogen

Table III: Computation of Analysis of Covariance on Estrogen (Scores in pg/ml)

Means	Exp Group I	Exp Group II	Control Group	SV	SS	df	MS	Obtained 'F'
Pre test	115.53	116.93	119.60	B	128.04	2	164.02	1.24
				W	2164.27	42	51.53	
Post test	111	114.87	120.40	B	669.64	2	334.82	6.38*
				W	2205.33	42	52.51	
Adjusted post test	112.73	115.27	118.27	B	217.91	2	108.95	17.62*
				W	253.58	41	6.18	

*Significant at 0.05 level. Table value required for significance at 0.05 level for *df* 2 and 42 is 3.22 and *df* 2 and 41 is 3.23.

Table IV: Computation of Scheffe's Post Hoc Test of Estrogen (Scores in pg/ml)

Control Group	Exp Group II	Exp Group I	MD	CI
118.27	115.27	-	5.48*	2.31
118.27	-	112.73	7.63*	2.31
-	115.27	112.73	2.15	2.31

*Significant at 0.05 level of confidence

Discussion on Estrogen

The table III showed pre, post and adjusted post test mean obtained F value 0.55, 8.21 and 21.96 respectively. This results clearly indicated that the effect of asanas and pranayama significantly decreased the estrogen level among women with ploycystic ovary syndrome in post and adjusted post test. Scheffe's Post Hoc test was given in the table IV indicated that the ordered adjusted final mean difference between groups.

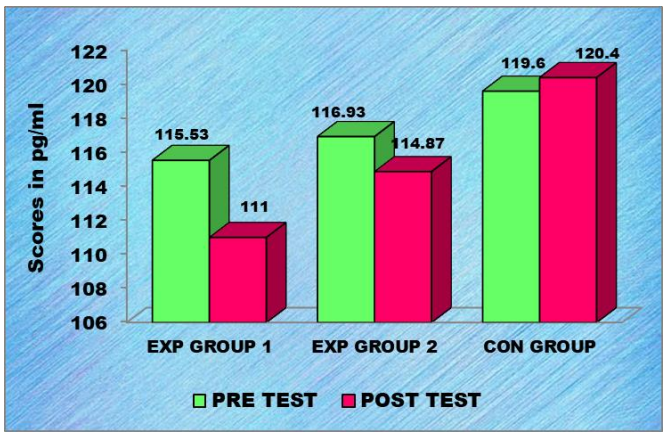

Fig 2: Bar Diagram Showing the Pre and Post Test Means of Estrogen (Scores in mg/dl)

Conclusion

PCOS is a prevalent disorder which is underpinned by weight independent IR and associated with reproductive and cardiovascular complications in women. Lifestyle modification, including exercise, is the first-line therapeutic approach in improving health outcomes in PCOS. Despite this, the present review identified exercise intervention in PCOS. Results from this review suggest that improvements in dependent variables such as high density lipoproteins and low density lipoproteins on length of asanas and pranayama intervention as significant benefits were observed in more sustainable of shorter duration. Regular, asanas and pranayama improves reproductive outcomes including ovulation and menstrual cycle regulation in addition to reducing weight women with PCOS. Future studies would benefit by using gold standard, comprehensive end points to provide mechanistic insights into PCOS particularly central feature of this endocrinopathy. Based on the results from this study, women with PCOS should be advised to engage in at least 90 min of asanas and pranayama six days per week to achieve improved reproductive and cardio metabolic outcomes.

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