

Effect of Supplementation of a Food Mixture Rich in Essential Fatty Acids on Women with Polycystic Ovary Syndrome

Ms. Yamunadevi Puraikalan

Assistant Professor, Department of Home Science, Mother Teresa Women's University, Kodaikanal, India.

Dr. Gomathy Shivaji

Reader and Head (Retd), Department of Home Science, Women's Christian College, Chennai, India.

ABSTRACT

Research into the dietary management of PCOS is lacking, despite the fact that lifestyle modifications including diet, exercise and weight loss have been shown to be beneficial. With this perspective, the present study was designed to determine the effect of supplementation of a food mixture rich in essential fatty acids on women with PCOS in the age group of 23 to 35 years for a period of 60 days. The effect of the supplementation was compared with that of women with PCOS without supplementation. Comparing the effect of supplementation in the experimental group with that of the control group, it can be inferred that the supplementation had a significant reduction in the serum luteinizing hormone, follicle stimulating hormone levels of the subjects.

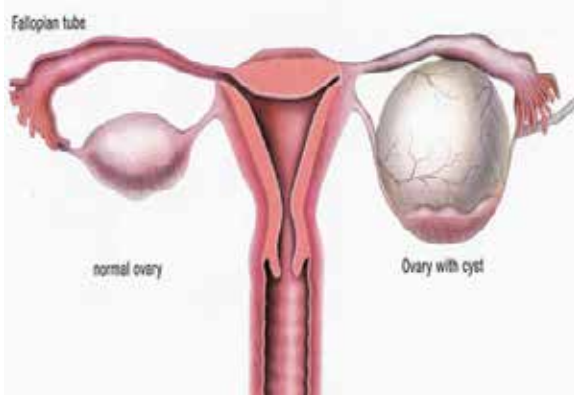
KEYWORDS: Polycystic ovary syndrome, Essential fatty acids.

INTRODUCTION

Polycystic ovary syndrome (PCOS), the association of multicyst ovaries with three cardinal physical manifestations, irregular or absent menstrual periods, hirsutism, and obesity, has been recognized at least since the 1930's. Stein and Leventhal were among the first physicians to describe and investigate the syndrome; thus PCOS is also known as Stein Leventhal Syndrome (Chang et al., 2000). It was not until 1976 that Huffman reported a series of adolescent girls with polycystic ovaries and hyperandrogenism. After that, it was postulated that PCOS is a disorder that begins at menarche and whose characteristics are not changed by age (Yen et al., 1990).

PCOS is the most common, yet complex endocrine disorder affecting women in their reproductive years (Abbott et al., 2002). There is increasing evidence to support a major genetic basis for polycystic ovary syndrome, since the syndrome is strongly familial (Frank et al., 1997). The structure of ovarian cysts is given in Fig. 1.

Figure 1 - Structure of ovarian cyst



The fundamental ovarian hormonal and functional abnormalities that accompany PCOS are infrequent or absence of ovulation, infrequent or absence of progesterone secretion, increased secretion of male hormones, persistent estrogen secretion, increased luteinizing hormone secretion, insulin resistance, and cystic ovaries (Roger and Martha, 2006).

Studies have shown that weight loss in obese women with PCOS significantly improved insulin sensitivity (Holte et al., 2000). Insulin resistance is the usual driving force for the PCOS condition in overweight women with PCOS. The elevated levels of insulin impact ovarian function, causing essentially the same alterations in ovarian function and

hormone production (Cela et al., 2003).

PCOS have also been shown to have deficiencies of essential fatty acids (EFA). It is therefore well worth ensuring that the diet contains plenty of the EFAs in cases of PCOS. The ratio of omega 6 to omega 3 that should be around 6:1 for fish eaters and 3:1 for vegetarians (The Encyclopedia of Natural Healing, 2000).

Women with PCOS often have chronic low grade inflammation in the body, and EFAs such as omega 3 are anti-inflammatory, as well as having many other beneficial effects in the body. Good sources include oily fish, flaxseeds, pumpkin seeds, sunflower seeds, almonds and even spirulina (Yashodhara et al., 2008).

MATERIALS AND METHODS

The present study was carried out to determine the effect of supplementation of a food mixture rich in essential fatty acids for a period of 60 days on the selected parameters such as fasting plasma glucose and serum insulin, serum luteinizing hormone, follicle stimulating hormone and thyroid stimulating hormone in women with PCOS. A group of twenty married women with PCOS was selected and divided into two groups of ten in each. A purposive sampling technique was employed to the subjects. It was a pre-test, post test experimental design with a control group without any supplementation.

The subjects were visited by the investigator for collecting the general information and to explain about the study. EFA mixture was supplemented to the selected subjects and the blood analyses was done prior to and after supplementation by a qualified laboratory technician. The ingredients used in the supplement were flax seeds(40g), walnut(20g), sesame seeds(10g), sunflower seeds(15g)) and 5 grams of almonds, fenugreek seeds and pumpkin seeds. The food items mentioned were blenderized to form a homogenous mixture. Forty grams of this mixture was weighed and packed in sterile polythene bags and sealed. Required amounts of the mixture were prepared periodically. The analyzed value showed that each 40 grams portion of the supplement contained 5.4 g of omega 3 fatty acid and 6.8 g of omega 6 fatty acid.

The data collected were analyzed using statistical methods like arithmetic mean, standard deviation and student t test.

RESULTS AND DISCUSSION

The results were shown in table 1 and it was found that there was 1% significant reduction in all the biochemical parameters excepting LH: FSH ratio and TSH levels after 60 days of supplementation. The initial mean fasting insulin level of the subjects in the experimental group was 13.81 ± 7.99 mU/mL after 60 days of supplementation of a food mixture rich in essential fatty acids, there was a significant reduction. The fasting plasma glucose level had decreased significantly from 94.00 ± 9.50 to 84.30 ± 8.56 mg/dl after supplementation. The serum

luteinizing hormone had decreased significantly from 7.50 ± 4.19 to 5.18 ± 4.01 mIU/mL. The reduction was significant at 1 per cent level of significance. A statistically significant reduction was found in the serum follicle stimulating hormone level from 7.18 ± 4.49 to 4.94 ± 3.25 mIU/mL after 60 days of supplementation. The LH: FSH ratio has slightly reduced from 1.37 ± 1.03 to 1.30 ± 0.92 , but it was not found to be statistically significant. The thyroid stimulating hormone levels were also found to be slightly reduced from 1.90 ± 0.94 to 1.77 ± 0.77 μ IU/ml, but it was not found to be statistically significant.

Holte et al. (2005) found that while insulin resistance in obese women with PCOS was reduced by weight loss. Studies using lifestyle modification have demonstrated improvements in ovulation and fertility with modest weight losses of 5 to 10 per cent of initial body weight (Pasquali et al., 2000).

Popp-Snijders et al. (2003) performed a study for the effects of omega-3 fatty acids on diabetics.

The subjects were supplemented with 3 grams of the omega-3 fatty acids daily, over an eight week period. The subjects showed enhanced insulin sensitivity and lower plasma triglyceride levels. Studies have shown that essential fatty acids can suppress hunger without causing changes in blood glucose. The mucilage properties to flax seed also contributes to controlling the blood glucose levels. It lines the digestive tract, slowing absorption of carbohydrates.

From the results of the present study, it can be inferred that the subjects in the experimental group experienced significant reduction in the serum luteinizing hormone, follicle stimulating hormone and LH: FSH ratio compared to that of the control group. The reduction was greater in the experimental group than the control group due to the supplementation of essential fatty acids rich food mixture. A mild reduction of serum TSH by 6.8 per cent was seen in the experimental group and 12.9 per cent in the control group.

CONCLUSION

Polycystic ovary syndrome is the most common endocrine disorder in women, affecting an estimated 5 to 10 per cent of women of reproductive age (Asuncion et al., 2000). Once thought of as a fertility problem, it is now known that PCOS is a metabolic disorder with serious health consequences. Sabate (2003) defines an optimal diet as one that not only prevents nutrient deficiencies by providing sufficient nutrients and energy for human growth and reproduction, but that also promotes health and longevity and reduces the risk of diet related chronic diseases. It may be concluded from the findings of the present study that the supplementation of a food mixture rich in essential fatty acids has a beneficial effect on biochemical parameters. The significant effect of the supplementation is an added advantage as it helps to reduce the body weight and would also help in regulating the body functions such as heart rate, blood clotting, fertility and play a role in immune function by regulating inflammation.

Table – 1: Comparison of biochemical parameters in both the groups before and after supplementation of EFA mixture

Variable	Group	Mean $\pm$ S.D.		t' value	Level of significance
		Initial	Final		
Fasting insulin (mU/mL)	Experimental	13.81 ± 7.99	11.27 ± 7.48	9.05	1%
	Control	14.26 ± 16.71	13.54 ± 15.38	6.08	1%
Fasting glucose (mg/dl)	Experimental	94.00 ± 9.50	84.30 ± 8.56	10.84	1%
	Control	96.00 ± 16.85	83.90 ± 10.46	5.27	1%
LH (mIU/mL)	Experimental	7.50 ± 4.19	5.18 ± 4.01	9.01	1%
	Control	5.03 ± 2.58	4.18 ± 2.41	5.96	1%
FSH (mIU/mL)	Experimental	7.18 ± 4.49	4.94 ± 3.25	4.37	1%
	Control	4.95 ± 2.87	4.49 ± 2.51	2.11	NS
LH:FSH ratio	Experimental	1.37 ± 1.03	1.30 ± 0.92	0.63	NS
	Control	1.12 ± 0.59	1.07 ± 0.72	0.68	NS
TSH (μ IU/ml)	Experimental	1.90 ± 0.94	1.77 ± 0.77	2.13	NS
	Control	2.09 ± 0.84	1.82 ± 0.81	2.69	5%

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