



STUDY OF BIOCHEMICAL PARAMETERS IN PCOS INDUCED RAT AND TREATED WITH FISH OIL, SHELL FISH OIL AND METFORMIN

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ABSTRACT

Polycystic ovary syndrome (PCOS) is a very common endocrine disorder among women in their reproductive age which is characterized by polycystic ovary, hyperandrogenemia and menstrual irregularity. The present study was undertaken to determine the effect of fish oil (Sardine oil) and shell fish oil (Krill oil) in the treatment of PCOS induced female Wistar rats on Protein, Albumin, Globulin, Random Blood Sugar (glucose), Cholesterol, Triglycerides and Blood urea nitrogen. Sixty Wistar albino female rats were divided into five groups each consisting of six rats. The control group received 1%CMC while the other four groups were administered orally with 1% Letrozole, once daily for 21 days. After 21 days the rats were fed with fish oil and Shell fish oil and Metformin for 30 days and 60 days. The results indicated that there was a change in the biochemical parameters after the treatment with fish oil and shell fish oil.

KEYWORDS : Letrozole, Polycystic ovary syndrome, hyperandrogenemia, menstrual irregularity, Sardine oil and Krill oil.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a multifactorial, heterogeneous, complex endocrine and metabolic disorder, (Homburg, 2009). Polycystic ovary syndrome is associated with reproductive and metabolic disorders which includes infertility, hyperandrogenism, luteinizing hormone (LH) hypersecretion, polycystic ovaries, insulin resistance and dyslipidaemia, with an increased risk of cardiovascular disease and diabetes mellitus, which can be a key factor for physical and emotional morbidity in affected women. The pathophysiology of PCOS is highly complex (Dunaif, 1997; Ehrmann, 2005; Franks, 2009; Wu et al. 2010; Shi & Vine, 2012; Macut et al. 2013). Many drugs are commercially available which are prescribed by the clinicians for the treatment of PCOS and Metformin is one of the most preferred drugs for treatment of PCOS in women, which is an insulin-sensitizing medication that lowers the excess levels of insulin in the body caused due to insulin resistance and thereby help to regulate the reproductive hormones and ovulation (Attia G. R. et al., 2001). Recent studies have confirmed that extended use of Metformin causes many side effects such as gastrointestinal symptoms of nausea, diarrhea, flatulence, bloating, anorexia, metallic taste and abdominal pain. (Hany Lashen, 2010). Therefore, it is necessary to find an alternative therapy. According to earlier reports, fish and shell fish oil helps in natural regulation of fertility (B. O. Yildiz et al., 2003 and Azadeh Nadjarzadeh, et al., 2013). Hence the present study was undertaken to study the potential effect of fish and shell fish oil in treatment of PCOS and to compare with Metformin.

MATERIALS AND METHOD

Sixty Wistar albino female rats weighing 150g -200 g were procured from Haffkine Biopharmaceuticals limited, Parel, Mumbai.

All the experimental animals were weighed and their health was verified. They were divided into 5 groups, each comprising of 6 rats and allowed to acclimatization for a period of 7 days to the laboratory conditions prior to initiation of study under standard environmental conditions (25 ± 2°C, 45 - 55% relative humidity, and 12 h dark/light cycle and were fed with Ragi pellets. Animals were assigned to cages and groups, two or three per cage and the individual animal was fur marked. The females were nulliparous and non-pregnant.

EXPERIMENTAL PROTOCOL

Using Letrozole Polycystic ovary was induced in the rats. The dose was made at the concentration of 1.0 mg/kg body weight 2.0 ml/kg of dose was administered once daily for a period of 21 days (Kafali, et

al., 2004) and during this period the vaginal smear was collected daily for estrous cycle studies. On the day subsequent to the last dose i.e from 22nd day, the animals were treated with fish oil and shellfish oil for 30 days and 60 days respectively. The dose was orally administered at 240 mg /kg/orally/daily (Ouladsahebmadarek E. et al., 2014

Group I: Normal 2.0 ml/kg of 1% Carboxymethyl Cellulose.

Group II: Letrozole Induced PCO (control)

Group III: Fish Oil at the dose levels of 240 mg /kg/orally/daily

Group IV: Shell Fish Oil at the dose levels of 240 mg /kg/orally/daily

Group V: Letrozole Induced PCO and treated with Metformin 2 mg/100g body weight.

At the end of the treatment period the animal were sacrificed by Euthanasia CO₂ gas in a desiccator (Pritchett K. et al., 2005; Hewett TA et al., 1993), the blood samples were collected by cardiac puncture from all the groups in EDTA containing vials and serum was analyzed for Biochemical parameters like Protein, Albumin, Globulin, Random Blood Sugar, Cholesterol, Triglycerides and Blood urea nitrogen.

STATISTICAL ANALYSIS

One-way analysis of variance (ANOVA) and statistical assessment of result was carried out using SPSS software 16 version.

RESULTS

PCOS induced rats exhibited high levels of glucose as compared to the normal group. After the treatment with Sardine oil and Krill oil the glucose levels were reduced. Metformin worked equally well to control the glucose levels. Similarly, the levels of Triglycerides and Total cholesterol was observed to be high in the induced group which after the treatment with metformin showed marked improvement, however the animals treated with fish oil and shell fish oil showed remarkable improvement. The total protein was high in induced animals as compared to the normal control rats, after the treatment with fish and shell fish oil it showed nearing normal levels. Whereas the Serum Albumin levels were decreased in induced rats which improved after the treatment with fish and shell fish oil. An increase in levels of serum globulin was recorded which after treatment with fish and shell fish oil was seen to be nearing normal levels. Similarly, there was significant change seen in Blood urea nitrogen levels which decreased after the treatment. The recovery was significant in Group: III which was given sardine oil as compared to the Group: IV which was treated with krill oil. The treatment for 60 days was found to be more effective than 30 days.

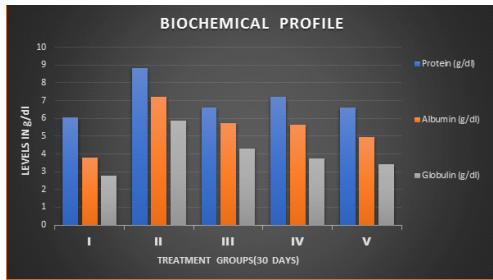


Figure: 1 Indicates the effect of fish and shell fish oil on Protein, Albumin, Globulin.

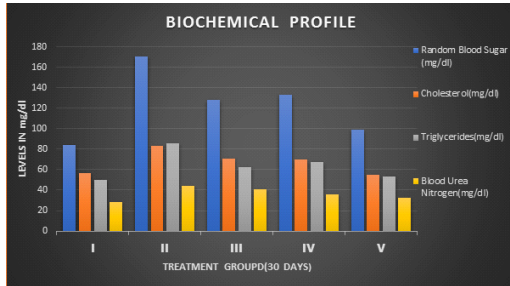


Figure: 2) Indicates the effect of fish and shell fish oil on Glucose, Cholesterol, Triglycerides and Blood Urea Nitrogen.

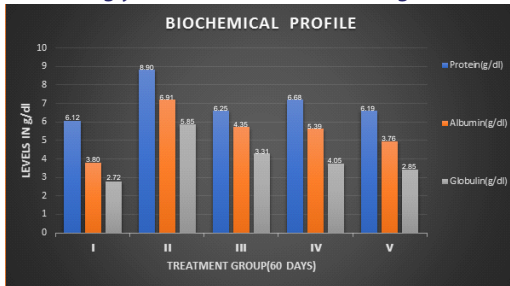


Figure: 3 Indicates the effect of fish and shell fish oil on Protein, Albumin, Globulin.

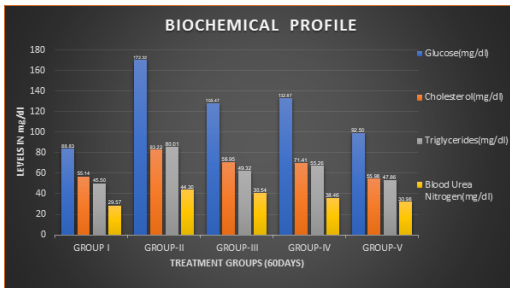


Figure: 4) Indicates the effect of fish and shell fish oil on Glucose, Cholesterol, Triglycerides and Blood Urea Nitrogen

DISCUSSION

Metabolic disturbances occur in women suffering from PCOS (Aziz.R et al., 2006 and Rotterdam Consensus Revised 2003). The glucose levels increased in the induced animals which shows the insulin resistance that may lead to type 2 diabetes, was brought to normal after the treatment with sardine oil as compared to krill oil. The triglycerides levels were high in induced rats which showed decreased levels after the treatment with Sardine oil and Krill oil. Research done by Glintborg D. et al., 2010 recorded that approximately 75% patients with PCOS are overweight showing waist-to-hip ratio (WHR) indicating increased abdominal fat deposition which caused obesity in these women. Whereas the total serum cholesterol was observed to be high due to which women suffering from PCOS are at high risk of developing cardiovascular disease (Fausser et al.,2004),which was normalized after the treatment with fish and shell fish oil, were reverting back to normal levels. A decrease in the albumin levels and increase in the globulin was observed which after the treatment with fish and shell fish oil

was similar to normal values. Similar results were recorded in the group treated with metformin.

The treatment period played a vital role, as the animals treated for 60 days showed better improvement than the animals treated for 30 days. The recovery was significant in Group: III which was given sardine oil as compared to the Group: IV which was treated with krill oil. It could be said that the Polyunsaturated fatty acids omega-3 (PUFA) present fish and shell fish oil, especially, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), are bioactive lipids that improved the Protein, Albumin, Blood glucose levels, cholesterol and triglycerides levels in PCOS induces rats and were nearing normal levels. Hence, Omega-3 also has a modulating effect on factors of metabolic syndrome, especially adiposity, dyslipidaemia, insulin resistance, diabetes, hypertension, oxidative stress (Kasim-Karakas SE et.al,2004 and Phelan N et.al,2011).

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