ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Variations in the Levels of LH and FSH Hormonal Status in Polycystic Ovaries Syndrome

Vindhiya Varshini V, Ashok Vardhan N*, Savitha G

Department of Biochemistry, Saveetha Dental College, Saveetha Institute Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

ABSTRACT

Polycystic ovarian disease is a state of enlarged ovaries with multiple cysts in it. It causes hormonal imbalance which leads to infertility and other problems in female age group of 16-35 years. 30 PCOS patients and 30 healthy individuals from the OP of Saveetha Dental College. Serum samples were analyzed for their hormonal status by using kit method in autoanalyzer. There is a significant increase in LH ($p<0.005$) and FSH ($p<0.001$) as well as the ratio of LH and FSH ($p<0.005$) by the influence of PCOS on them. The study states that high risk of poly cystic ovaries may leads hormonal imbalance which may leads to infertility in female with PCOS complaint.

* Corresponding Author

Name: N. Ashok Vardhan
Phone: +91-8778469065
Email: ashokbiochemists@gmail.com

INTRODUCTION

PCOS is a very common disorder affecting 4-12% of women of reproductive age (Knochenhauer ES *et al.,* 1998). PCOS is a hormonal disorder with enlarged ovaries with multiple cysts on the outer edges of ovaries. It also causes non-frequent or prolonged menstrual periods or sometimes release in excess of male hormone (Rotterdam ESHRE., 2004). PCOS patients have a higher chance of metabolic and cardiovascular diseases in their life style (V. De Leo *et al.,* 2016). PCOS is common condition in females in their fertile age group, it's characterized by hyperandragonism, oligmenorrah and multiple or polycysts, it is also known as a leading cause of female infertility (David A *et al.,* 2017).

PCOs have a hypendransogenzyme or long term appendix when there is no specific adrenal or pituitary disease (Dunaif A *et al.,* 2001). Long-term imitation oligomenorrhea, amenorrhea, presents as dysfunctional cervical bleeding or infertility (Conway GS *et al.,* 1989). The symptoms include irregular menstruation, irregular ovulation, excess hair growth on face and body, thinning of hair and accumulation of un-ruptured follicles (Ruksana Sheik., 2015). Polycystic ovaries are characterized by the cell hyperplasia an ovarian cortical thickening (Cho LW., 2006).

Few researchers stated that the imbalance in hormonal values because of the poly cysts present in the enlarged ovaries. This influences specially the levels of fertility hormones like LH and FSH (Moran C *et al.,* 2003). It has been studied by so many researchers that the altered hormonal levels or hormonal imbalance may leads to infertility (Mor E., 2004). If in case patients were diagnosed as PCOS, it is important to know the status of LH and FSH levels to know their influence on infertility or delayed fertility (Marcondes JA *et al.,* 207, Fritz MA *et al.,* 2011, CHANG R., 1983, Pastor Carmen L., 1998)

MATERIALS AND METHODS

Patients were selected from those attending the outpatient department of Saveetha Dental College,

Table 1: Mean, SD and Significance value of LH, FSH and LH, FSH ratio in two groups

Parameters	Controls	PCOS patients	p-Value
LH	5.99 ± 3.54	94.03 ± 35.09	<0.005*
FSH	5.4 ± 2.78	25.43 ± 12.71	<0.005*
LH/FSH ratio	1.31 ± 0.72	4.33 ± 1.98	<0.005*

and hospitals and divided into two groups as follows

Group I – Normal healthy individuals with normal BMI – (19-24.9) – 30 individuals

Group II – PCOS Individuals – 30 individuals

Inclusion Criteria

- Individuals with the age group of twenty to thirty years
- PCOS Individuals

Exclusion Criteria

- Individuals with other systemic illness like cardio vascular disease, Renal failure, Stroke, endocrine illness.
- Individuals with acute illness like fever.
- Immunocompromised individuals

Sample collection

Informed consent was obtained from the patient before sample collection. 3ml of venous blood was collected and distributed in plain collection tubes and centrifuged in 3000rpm for serum. Then serum was separated and analysed to estimate the LH and FSH by ELISA Method using ROBONIK ELISA READER.

RESULTS AND DISCUSSION

The LH levels of PCOS 94.03 ± 35.09 were significantly high when compared with health individuals 5.99 ± 3.54 the significant value is p<0.005, the levels of FSH. The ovulation process regulated by LH and FSH hormones. LH and FSH secretion depends on the pituitary gland in the brain. The normal range of LH and FSH hormone levels in the beginning of cycle will be around 5-20 mlU/ml. It is very common in both normal and PCOS incidence the LH and FSH levels were equal in the early part of the cycle.

There will be a particular raise in the LH levels 24 hrs before ovulation occurs, the LH levels will increase up to 25-40 IU/L. The LH levels will come down once the ovum released from the ovary. Even though there is a significant decrease in the LH after ovulation but the levels of LH were three folds higher than the FSH levels. It is typical to maintain LH levels around 18 IU/L for women with PCOS problem. FSH level of about 6 IU/L

This situation of hormonal levels in 3:1 ratio of LH and FSH levels is called an elevated LH to FSH ratio.

Disrupt ovulation occurs by these changes in LH and FSH ratio. It is described as these levels estimation is an important aspect in diagnosis of PCOS, few studies were also saying that its less useful in diagnosis of PCOS, but may helpful when looking into the overall picture (E.Sterling., 2015).
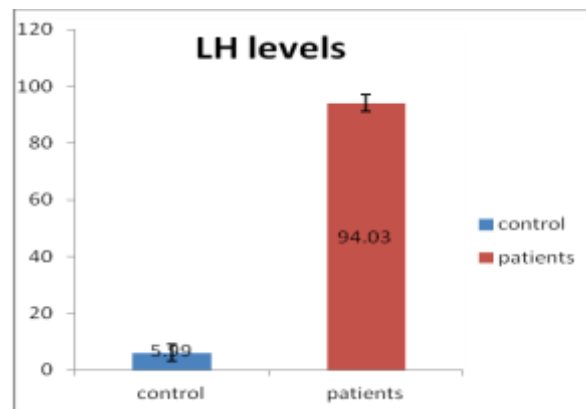
Figure 1: LH levels variations in control and PCOS
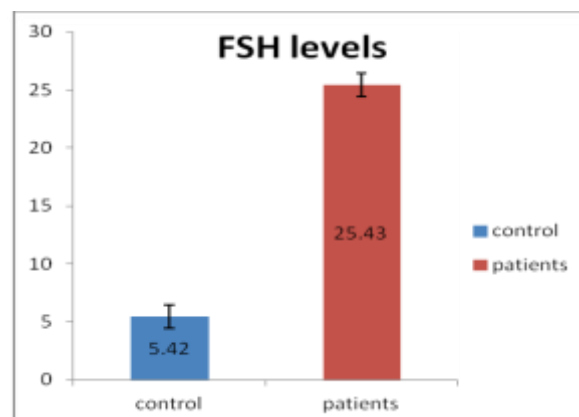
Figure 2: FSH levels variations in control and PCOS
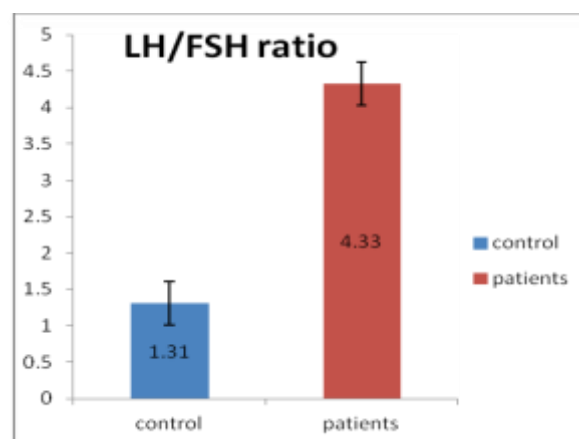
Figure 3: LH and FSH levels variations in control and PCOS

FSH is often measured 2 or 3 day of cycle which is the early follicular phase, although variation exists among laboratories. In third day of cycle, FSH of 10 IU/L or less is considered optimal, with a concordant estradiol of 50 pg/mL or less. FSH / estradal levels require two types of special attention. The patient with a substantially increased FSH and low estradal in the first follicular stage. From this perspective, pituitary tried to highlight ovaries to develop oocytes, but the ovaries were not able to respond, resulting in low circulation estradiol and as a result negatively hypothalamus and pituitary. This model refers to hypergonadotropic hypogonadism and reduced ovarian reserve. The latter variation is either a low or normal FSH patient, but at the beginning of the menstrual cycle higher estradiol (> 75 pg / mL). This suggests that the available pool of oocytes is low and the menstrual cycle can initially dominate. This pattern refers to a reduced ovarian reserve (JANI R et al., 2014).

FSH and LH levels are commonly used to measure ovulation storage in the early folicular phase, although they are low estimates (Liu KE et al., 2008). The LH / FSH ratio plays an important role in determining the correct position of the ovarian reserve. The abnormal gonadotropin secretion pattern in PCOS is characterized by increased serum LH levels and an increased LH/FSH ratio (Kubota T., 2013, Ehrmann DA., 2005). Increased frequency of gonadotropin-releasing hormone secretion favors transcription of the β-subunit of LH over the β-subunit of FSH, which causes the increase in the LH/FSH ratio in PCOS patients. These changes and the development of polycystic ovaries lead to ovarian hyperandrogenism, oligo anovulation, stromal growth, and accumulation of dysfunctional, cystic follicles in the ovaries (Alexandros N., 2018).

CONCLUSION

The study states that high risk of polycystic ovaries may lead to hormonal imbalance which may lead to infertility in female with polycystic ovarian syndrome complaint. our findings suggest that LH and FSH levels has an impact on PCOS.

REFERENCES

Alexandros N. Vgontzas Richard S. Legro Edward O. Bixler Allison Grayev Anthony Kales George P. Chrousosv. Polycystic Ovary Syndrome Is Associated with Obstructive Sleep Apnea and Daytime Sleepiness: Role of Insulin Resistance*The journal of Clinical Endocrinology and Metabolism* 2018 Vol. 86, No. 2

CHANG, R. JEFFREY. "Insulin Resistance in Nonobese Patients with Polycystic Ovarian Disease*." *The Journal of Clinical Endocrinology & Metabolism* 57.2 (1983): 356-359.

Cho LW, Jayagopal V, Kilpatrick ES, Holding S, Atkin SL. The LH/FSH ratio has little use in diagnosing polycystic ovarian syndrome. *Ann Clin Biochem.* 2006;43(Pt 3):217–219. (PubMed).

Conway GS, Honour JW, Jacobs HS. Heterogeneity of the polycystic ovary syndrome: clinical, endocrine and ultrasound features in 556 patients. *Clin Endocrinol* (Oxf) 1989;30:459–470. (PubMed)

David A, Ehrmann, MD. Polycystic ovary syndrome,Pubmed; *Medicine Journal* July 28, 2017. PMID :15788499

Dunaif A, Thomas A. Current concepts in the polycystic ovary syndrome. *Annu Rev Med.* 2001;52:401–419. (PubMed) (Ref list)

E.STERLING, Hormone levels and PCOS, Polycystic Ovary Syndrome (PCOS), *ObGyn Nurses, Pregnancy and Birth, Infertility,*November 07,2015.pg no: 2.

Ehrmann DA. Polycystic ovary syndrome. N Engl J Med.N Engl J Med. 2005;352:1223–1236. (PubMed).

Fritz MA, Speroff L. Association between serum gonadotropin level and insulin resistance-related parameters in Korean women with polycystic ovary syndrome. 8th ed. *Philadelphia (PA): Lippincott Williams & Wilkins;* 2011. pp. 501–518.

JANI R. JENSEN, Fertility evaluation and treatment for PCOS,*the ob/gyn generalist,*July 01,2014,pg no: 4.

Knochenhauer ES, Key TJ, Kahsar-Miller M, Waggoner W, Boots LR, Azziz R. Prevalence of the polycystic ovary syndrome in unselected black and white women of the southeastern United States: a prospective study. *J Clin Endocrinol Metab.* 1998;83:3078–3082. (PubMed) (Ref list)

Kubota T. Update in polycystic ovary syndrome: new criteria of diagnosis and treatment in Japan. *Reprod Med Biol.* 2013;12:71–77. (PMC free article) (PubMed)

Liu KE, Greenblatt EM. Elevated day 3 follicle-stimulating hormone/luteinizing hormone ratio >or= 2 is associated with higher rates of cancellation in in vitro fertilization-embryo transfer cycles. *Fertil Steril*. 2008;90(2):297–301. (PubMed)

Marcondes JA, Yamashita SA, Maciel GA, Baracat EC, Halpern A. Metformin in normal-weight hirsute women with polycystic ovary syndrome with normal insulin sensitivity. *Gynecol Endocrinol.* 2007 May;23(5):273–8. (PubMed)

Mor E, Zograbyan A, Saadat P, Bayrak A, Tourgeman DE, Zhang C, et al. The insulin resistant subphenotype of polycystic ovary syndrome: clinical parameters and pathogenesis. *Am J Obstet Gynecol.* 2004 Jun;190(6):1654–60. (PubMed)

Moran C, Garcia-Hernandez E, Barahona E, Gonzalez S, Bermudez JA. Relationship between insulin resistance and gonadotropin dissociation in obese and nonobese women with polycystic ovary syndrome. *Fertil Steril.* 2003 Dec;80(6):1466–72. (PubMed)

Pastor Carmen L. "Polycystic Ovary Syndrome: Evidence for Reduced Sensitivity of the Gonadotropin-Releasing Hormone Pulse Generator to Inhibition by Estradiol and Progesterone 1." *The Journal of Clinical Endocrinology & Metabolism* 83.2 (1998):582-590.

Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. *Fertil Steril.* 2004;81:19

Ruksana Sheik, Awareness of Obesity as a Risk Factor for Polycystic Ovary Syndrome, BDS Student,Saveetha dental college and hospitals, Chennai 162, Poonamallee High Road, Thiruverkadu,Chennai - 600077. *Journal of Pharmaceutical sciences and research* Vol. 7(7), 2015, 471-473

V. De Leo, M. C Musacchio, V. Cappelli , M. G. Massaro, G Morgante and F. Petraglia Genetic, hormonal and metabolic aspects of PCOS: an update *Reprod Biol Endocrinol.* 2016; 14: 38. (PubMed).