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Variations in the levels of LH and FSH hormonal status in Obesity condition

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ABSTRACT

The study aims to access the variations in the levels of LH and FSH hormonal status in Obesity condition. Nowadays obesity is a very common condition we can see in most of the people living in developing countries. It causes so many other health problems along with their regular lifestyle habituates. In that infertility is one of the important problems occurs due to obesity by altering the hormonal levels in the female population. 30 obese patients and 30 healthy individuals from the OP of Saveetha Dental College. Serum samples were analysed for their hormonal status by using a kit method in auto analyser. There is a significant increase in LH (12.88 ± 6.69) and FSH (9.55 ± 4.8) as well as their ratio (LH/FSH- 1.93 ± 2.13) by the influence of obesity on them. The study states that a high risk of obesity may lead to hormonal imbalance which may lead to infertility in obese female patients.



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INTRODUCTION

It is well known that obesity is one of the most common condition affected in most of the developed and developing countries (Andrew M Prentice *et al.*, 2006). Obesity is a systemic oxidative stress condition. In this, the rise in lipid peroxidation, release of reactive oxygen species and a decrease in antioxidant status will occur (Stephanie A. Shore *et al.*, 2011).

Energy imbalance is said to be a major cause for obesity, that is calories consumed were relatively higher than the calories utilised, it causes the caloric imbalance which mainly leads for the fat deposition which in terms leads to obesity (Brian E. Sansbury *et al.*, 2014). There are many other rea-

sons like lifestyle, occupation, working environment and social influence etc., for the cause of obesity (Kaushik Bose *et al.*, 2007).

So many researchers have studied that the altered hormonal levels or hormonal imbalance may lead to infertility (Silvia Vannuccini *et al.*, 2016, Serge A Jabbour *et al.*, 2007). It is important to know the status of LH and FSH in case of delayed fertility or else in infertility (Gottumukkala Achyuta Rama Raju *et al.*, 2013, Serge A Jabbour *et al.*, 2007, Cho *et al.*, 2006, Morales *et al.*, 1996). Few of the researchers have discussed that obesity is also one of the reason which may can cause infertility by altering the hormonal levels (Zeynep Özcan *et al.*, 2015, Ruksana Sheik *et al.*, 2015, F.Galtier-Dereure *et al.*, 1997, Gambineri A *et al.*, 2002, Vrbikova J *et al.*, 2009, Pasquali R *et al.*, 1993). Obesity modifies insulin sensitivity and gonadotrophins dynamics and is associated with disorders of spontaneous ovulation (Ruksana Sheik *et al.*, 2015). High concentrations of leptin are possibly weight and spontaneous ovulation (F.Galtier-Dereure *et al.*, 1997). Hence this study aims to access the variations in the levels of LH and FSH hormonal status in obesity condition.

MATERIALS AND METHODS

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

and hospitals and divided into two groups as follows

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

Group II – Obese Individuals with Increased BMI (30-40) – 30 individuals

Inclusion Criteria

Individuals with the age group of twenty to thirty years

Obese Individuals

Females with regular menstrual cycle

Exclusion Criteria

Individuals with other systemic illness like cardiovascular disease, Renal failure, Stroke, endocrine illness.

Individuals with an acute illness like a 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 results of the study revealed that there is a significant increase in LH, FSH, LH and FSH levels in obese patients. There is a significant increase in LH (12.8 ± 6.69) of Obese compared with healthy control the significance value is $p < 0.005$. There is a significant increase in FSH (9.55 ± 4.8) of Obese compared with healthy control the significant value is $p < 0.005$.

LH and FSH are called gonadotropins because they stimulate the gonads-in males, the testes and in females the ovaries. The pituitary gland secretes both LH and FSH in the brain. In women, FSH hormone stimulates the growth of ovarian follicles in the ovary before the release of an egg from one follicle at ovulation and LH helps to regulate the menstrual cycle and egg production (Serge A Jabbour *et al.*, 2007). LH and FSH levels usually range between about 5-20 mIU/ml. Most women have about equal amounts of LH and FSH during the early part of their cycle. However, there is an LH surge in which the amount of LH increases to about 25-40 mIU/ml 24 hours before ovulation occurs. Once the ovary releases the egg, the LH levels go back down (Cho *et al.*, 2006). Regular reproductive

hormonal cycle in women is characterised by fluctuating gonadal hormonal level, well regulated by hypophyseal-pituitary- gonadal axis. In obese women, gonadotropin secretion is affected because increased peripheral aromatisation of androgens to estrogens (Zeynep Özcan *et al.*, 2015). The levels of luteinizing hormone (LH), androstenedione, estrone, insulin, triglycerides, and very low-density lipoprotein are increased, and high-density lipoprotein levels are decreased in obese women. The changes in these hormonal and some substrate levels deteriorate the neuro-regulation of the hypothalamic-pituitary-gonadal (HPG) axis (Zeynep Özcan *et al.*, 2015, Ruksana Sheik *et al.*, 2015, F.Galtier-Dereure *et al.*, 1997). These alterations may lead to impaired ovulatory function, bad reproductive health and different gynaecological effects (Gambineri A *et al.*, 2002, Vrbikova J *et al.*, 2009, Pasquali R *et al.*, 1993, Laksman Laln *et al.*, 2017).

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

Parameters	Controls	Obese patients	p-Value
LH	5.99 ± 3.54	12.88 ± 6.69	<0.005*
FSH	5.4 ± 2.78	9.55 ± 4.8	<0.005*
LH/FSH ratio	1.31 ± 0.72	1.93 ± 2.13	<0.005*

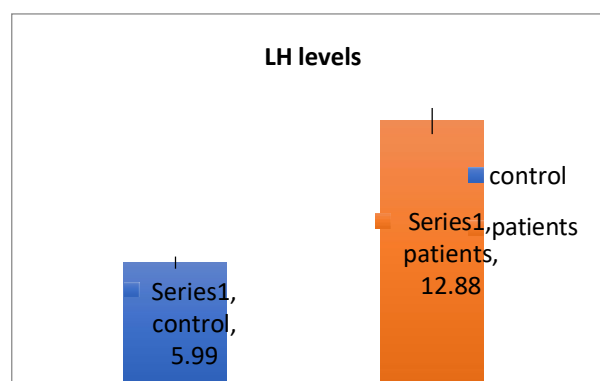


Figure 1: The levels of (LH)

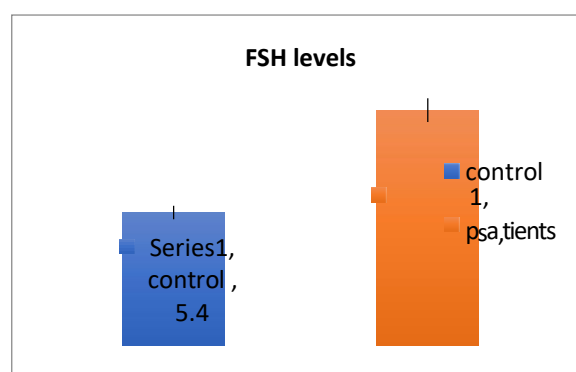


Figure 2: The levels of (FSH)

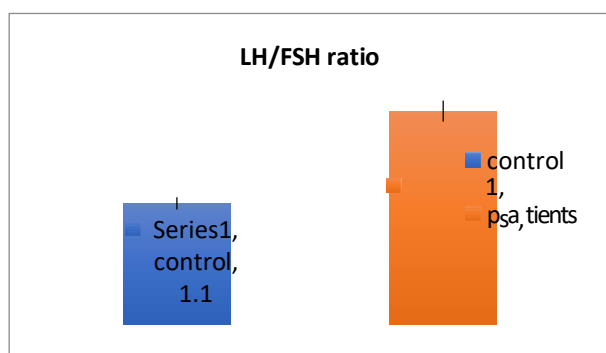


Figure 3: The ratio between LH and FSH

One such condition of infertility is PCOS, which is caused due to the partially formed follicles on the ovaries, with each follicle containing an egg which rarely grows to maturity or produces eggs that can be fertilised. In PCOS women, the LH level is often two or three times higher than that of the FSH level. This change in the LH to FSH ratio is enough to disrupt ovulation and cause infertility (Janet E *et al.*, 2010, Priyanka Shenoy. B *et al.*, 2016). In our study, it is evident that LH and FSH levels are raised in Obese in comparison with the control group. Therefore, these Obese patients may have the higher incidence of menstrual dysfunction and anovulation (Priyanka Shenoy. B *et al.*, 2016)

CONCLUSION

The study states that a high risk of obesity leads to hormonal imbalance which may lead to infertility in obese female patients. Overweight and should be informed about the should be encouraged to lose weight before the treatment to reduce the poor obstetrical outcomes due to obesity. Diet, ex-ercise and maintaining a healthy body weight may help many obese women to manage the symptoms of infertility and other gynaecological effects.

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