

The relationship between obesity and sex hormones in infertile women

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Abstract

Introduction Obesity causes alteration of sex hormones levels and should be evaluated as the cause of altered sex hormonal profile.

Aim: To determine the effect of obesity on sex hormones in both fertile and infertile women

Method : Serum levels of LH, FSH, free testosterone on day three of menses were determined quantitatively to find the relation and contribution of obesity and sex hormones in causation of infertility.

Results :Obesity caused increase of serum LH levels in both fertile and infertile women. Value of FSH was significantly decreased in infertile women and obesity affected increase in serum Free Testosterone levels in both fertile and infertile women

Conclusion : Obesity causes increase of LH and free testosterone in both fertile and infertile women. Baseline levels of serum FSH were lower in infertile women as compared to fertile women. Obesity did not alter the levels of serum FSH.

Keywords: Obesity, BMI, Testosterone, LH, FSH

Introduction

The growth and the reproductive activities of the gonadal tissue are controlled by the gonadotrophins hormone LH and FSH .The secretion of both LH and FSH is stimulated by gonadotrophin releasing hormone from the hypothalamus, LH and FSH both are subjected to feed back loops regulation by the ovarian hormones.

According to Blum et al, in healthy girls during puberty, the percentage of body fat rises resulting in an elevation of serum leptin and in FSH, LH as well as estradiol in girls. Higher level of LH was associated with elevation of leptin level, which is a protein released from white adipose tissue and its blood level depends on levels of fat

stores. More the fat stores, more will be the blood leptin level causing elevation of serum LH. Kopp et al., also state that obesity causes alteration of sex hormones levels and should be evaluated for the cause of altered sex hormonal profile.

Aims and objectives

To determine the effect of obesity on sex hormones in both fertile and infertile women by studying the difference in levels of sex hormones in fertile and infertile women corresponding to their BMI.

Materials and methods

Fertile and infertile women were divided into two groups each of which was further

divided into two groups on the basis of BMI, BMI<25(normal) and BMI ≥25 (overweight or obese women).These were in the age group of 20-35 years , having menstrual cycle length of 26-55 days. Serum levels of LH, FSH, free testosterone on day three of menses were determined quantitatively to find the relation and contribution of obesity and sex hormones in causation of infertility. All women had normal USG, normal serum prolactin and thyroid profile and had no visible signs of hyperandrogenism.

Mean values of serum LH, FSH and free testosterone were calculated of each group. Values of all the three hormones were compared in fertile normal and fertile obese groups using unpaired ‘t’ test. Values of all the three hormones were compared in infertile normal and infertile obese groups using unpaired ‘t’ test. Fertile normal group were also compared with infertile normal group (and same for infertile groups) separately using unpaired ‘t’ test.

Observations

There were 28 women in each group. Correlation of BMI with sex hormones in both fertile and infertile groups was done. Value of LH was significantly increased in obese fertile women than normal fertile women (p<0.0001). Also, it was significantly increased in obese infertile

women than normal infertile women (p<0.0001). There was no statistically significant difference between normal fertile and normal infertile women (p =0.3860) nor between obese fertile and obese infertile women.

Value of FSH was significantly decreased in infertile women, both normal and obese than fertile women, both normal and obese. There was no statistically significant difference between normal fertile group and obese fertile group (p=0.8357) nor between normal infertile group and obese infertile (p=0.6615).

Value of Free Testosterone was significantly increased in obese fertile women than normal fertile women. Also, it was significantly increased in obese infertile women than normal infertile women but there was no statistically significant difference between normal fertile and normal infertile women nor between normal infertile and obese infertile women. Obesity caused increase in serum Free Testosterone levels in both fertile and infertile women and baseline values of this hormone was same in both fertile and infertile women corresponding to their BMI. It showed that obesity rather than fertility status had more pronounced effect on levels of both serum LH and Free Testosterone levels.

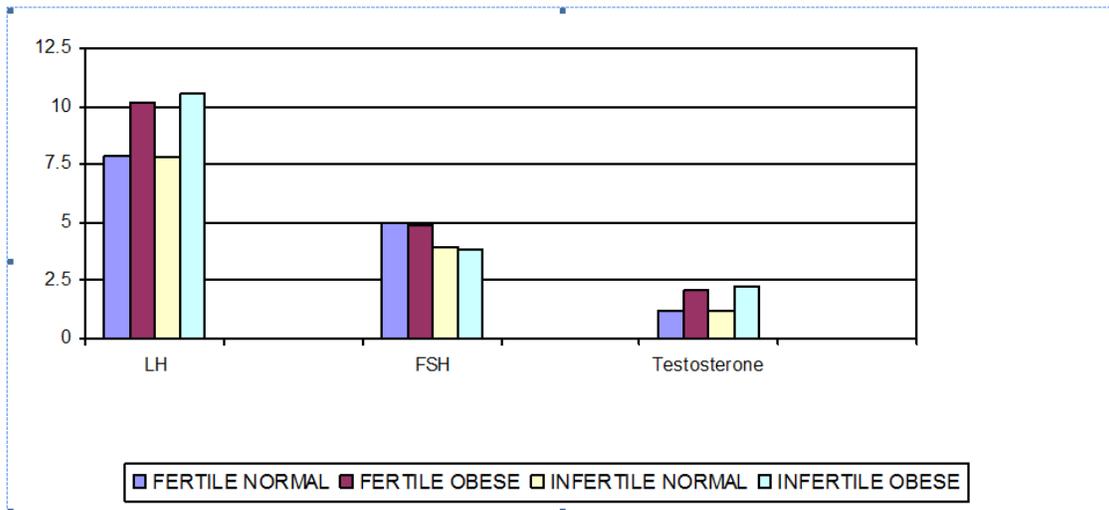


Fig 1: Hormonal level in Different Groups

Table 1: Correlation of mean serum values of hormones with BMI

	Fertile women		Infertile women	
	BMI<25 (n=28) (Group 1)	BMI≥25 (n=28) (Group 2)	BMI<25 (n=28) (Group 3)	BMI≥25 (n=28) (Group 4)
LH	7.91±0.4	10.21±0.97	7.81±0.37	10.56±0.56
FSH (mIU/ml)	4.95±0.7	4.92±0.3	3.92±0.2	3.89±0.3
Free Testosterone (ng/ml)	1.21±0.1	2.11±0.8	1.16±0.1	2.21±0.9

Discussion

Our results showed that obesity causes increase of serum LH levels in both fertile and infertile women and there is no significant difference in baseline LH level of fertile and infertile women when compared with their corresponding BMI, in patients with normal USG, normal thyroid profile and S. prolactin, and without any visible signs of hyperandrogenism. An abnormal feedback mechanism by ovarian estrogen is supposed to play role in this discriminated increase in LH release.

Some studies contradict our results. Insler et al., reported that the non-obese PCOS women had significantly higher level of serum LH than obese counterparts. Yanira et al., agreed that an inverse relationship between LH and BMI in PCOS as their study suggests that the effect of BMI on LH is mediated at pituitary level and not a hypothalamic level in those patients. Kiddy et al also found an inverse correlation.

Our study showed that obesity does not cause alteration of serum FSH level in both fertile and infertile women and that infertile women have low values of serum FSH than that of fertile women corresponding to their BMI. Mohan and Mazher also reported that serum FSH levels on 3rd day of cycle are within the normal range but on the lower side in infertile women as compared to fertile women.

Our study signified that obesity causes increase of serum Free Testosterone levels

in both fertile and infertile women. There was no significant difference in baseline Free Testosterone level of fertile and infertile women when compared with their corresponding BMI. Sowers et al., state that Body mass index, waist/hip ratio, and percent body fat were all positively associated with testosterone concentrations. In their study, Cauley et al., focused on the anthropometric predictors of androgen concentrations in women and found a positive relation.

Conclusion

Obesity causes increase of LH and free testosterone in both fertile and infertile women. Baseline levels of serum FSH were lower in infertile women as compared to fertile women. Obesity did not alter the levels of serum FSH.

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