

Leptin levels during follicular and luteal phases of menstrual cycle

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Objective

To explore the status of serum leptin levels in various phases of menstrual cycle in females of child bearing age.

Methods

This observational study was carried out at Shifa College of Medicine, Islamabad in which serum leptin level of 83 females of reproductive age in various phases of female monthly cycle was measured, after taking an informed written consent.

Results

Mean serum leptin level of women during follicular phase was 54.6 ± 33.4 ng/ml and luteal phase 53.5 ± 38.8 ng/ml as assessed from last menstrual period ($p=0.253$). Serum Leptin level was found to

be significantly higher in normal weight women during follicular phase (37.3 ± 24.8 ng/ml) as compared to normal weight women in luteal phase (24.5 ± 14.3 ng/ml) with p value 0.040. In overweight females, no significant difference was found between serum leptin level during follicular phase (78.84 ± 29.07 ng/ml) and luteal phase (81.4 ± 34.2 ng/ml), with p value 0.369.

Conclusion

We found no significant change in serum leptin level during follicular and luteal phases of menstrual cycles in healthy females. (Rawal Med J 2009;34:180-182).

Key words: Leptin, menstrual cycle, follicular, luteal.

INTRODUCTION

Leptin, a protein produced and released by adipose cells,¹ controls body fat tissue and hence body weight, by reducing food intake and increasing thermogenesis.² It is a cytokine-like molecule that influences multiple neuroendocrine systems, including those related to puberty, fertility, and energy homeostasis.³ It has been suggested that leptin plays an important role in reproduction.⁴ It is a metabolic signal to the neuroendocrine reproductive system and under conditions of inadequate energy reserves, low leptin levels act as a metabolic "gate" to inhibit the activity of the neuroendocrine reproductive axis in both sexes.⁵ There is a slight decrease of serum leptin level in postmenopausal than premenopausal women.⁶ Rise in serum leptin level at the onset of puberty and fall in postmenopausal women, suggested that leptin levels may be associated with normal reproductive events⁷ with influences on physiologic processes such as menstruation, pregnancy and lactation.⁸ Leptin can restore ovulatory menstrual cycles and improve reproductive and thyroid hormones and bone markers in hypothalamic amenorrhea.⁹ Serum leptin level has been shown to significant

increase in the late follicular phase¹⁰ and did so on the day of the onset of the luteinising hormone (LH) surge.¹¹ A significant increase in serum leptin level in the late luteal phase¹² and again only small, not statistically significant variations during the menstrual cycle has been reported.¹³ The present study has been designed to explore the status of serum leptin levels in follicular and luteal phases of menstrual cycle in females of child bearing age.

SUBJECTS AND METHODS

This study was carried out at Shifa College of Medicine, Islamabad from January 2005 to August 2005. Females of reproductive age (13 yrs to 45 yrs), with normal menstrual cycles, who gave an informed written consent, were included in the study. Females with irregular menstrual cycles were excluded from the study. Non probability convenience sampling technique was used. Serum leptin level of 83 females in various phases of female monthly cycle were measured. Leptin levels were measured by DSL-10-23100 Active Human Leptin ELISA.

To evaluate the effect of BMI on serum leptin levels during luteal and follicular phase of menstrual

cycle, all subjects were divided into two groups, normal weight with BMI of less than 25 and overweight with BMI 25 and above. Data were analyzed using SPSS version 10.

RESULTS

Out of 83 females, 36 were in follicular phase, 47 in luteal phase. Mean serum leptin levels during follicular and luteal phase were not significantly different from each other with p value 0.253 (Table 1).

Table 1. Serum leptin levels during various phases of menstrual cycle.

	Follicular phase (n = 36)	Luteal phase (n = 47)	Significance (p value)
Mean leptin levels (ng/ml)	54.6 ± 33.4	53.5 ± 38.8	0.253

In 44 females who were normal weight, serum leptin level of 21 women were analyzed during follicular phase, which were found to be 37.3±24.8 ng/ml and in 23 women during luteal phase, which were found to be 24.5±14.3 ng/ml. Leptin levels were found to be significantly higher in follicular phase, with p value 0.040.

Table 2. Serum leptin levels during various phases of menstrual cycle in normal weight and overweight females.

	Mean leptin levels (ng/ml)		Significance
	Follicular phase	Luteal phase	(p value)
Normal weight	37.3 ± 24.8	24.5 ± 14.3	0.040*
Over weight	78.84 ± 29.07	81.4 ± 34.2	0.369

In 39 females who were overweight, leptin levels were analyzed in 15 women during follicular phase. They were found to be 78.84±29.07 ng/ml, whereas leptin levels in 24 women were analyzed during luteal phase and were found to be 81.4±34.2 ng/ml. Serum Leptin level was higher in overweight women during luteal phase but the difference was not significant with p value 0.369.(Table 2)

DISCUSSION

Our data revealed that no significant difference was found in the serum leptin level in follicular and luteal phases of menstrual cycle. This finding is

consistent with those of a study performed by Lin.¹⁴ Similar findings were observed in a study conducted by Okudan et al who found that serum leptin concentration do not change during the cycle, in young females with normal menstrual cycles.¹⁵ However, this observation is contrary to the findings in other studies where leptin levels were found to be more in luteal phase as compared to the follicular phase.^{12, 16,17} Hardie *et al* reported that leptin levels were highest during luteal phase.¹⁸ The leptin values were found higher during the luteal phase than the follicular phase of the cycle.¹⁹

Cella et al. found that serum leptin concentration differs during the menstrual cycle increasing in the luteal phase of the cycle.¹⁶ Similar findings were seen in another study where plasma leptin increased by approximately 50% during the late follicular and luteal phases of the menstrual cycle.¹⁰ In our study, we found no significant change in leptin levels during various phases of menstrual cycles in normal females. Analysis of multiple samples of serum leptin during various phases, and consideration of other factors affecting leptin levels may provide more information in this regard.

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