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Variation of Haemoglobin level during Follicular and Luteal Phases of menstrual cycle

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Abstract
A cyclic event occurs in women of reproductive age, called as menstrual cycle. During this, variation in levels of steroid sex hormones occurs that influences various organs of humans including haematopoiesis.
Aim: Assess the variation in levels of haemoglobin during the follicular and luteal phases of menstrual cycle.
Materials and methods: Fifty girls were a part of this study. Heparinized whole blood samples were drawn during the follicular and luteal phases, and levels of haemoglobin recorded using colorimetric method. The data was subjected to statistical analysis.
Statistical analysis: Student t-test was used to analyse the values of haemoglobin levels obtained.
Conclusion: Statistically non-significant variation occurs in the levels of haemoglobin between the follicular and luteal phases of menstrual cycle.

Keywords: Haemoglobin, Follicular, Luteal Phases, haematopoiesis

1. Introduction
Menstruation is the physiological shedding of the endometrium and discharge of blood from the endometrial arteries [1]. The menstrual flow starts from the moderate level, increases and gradually decreases. The duration of menstruation is about 4–5 days and the amount of blood loss is estimated to be 20-80 ml with an average menstrual blood loss during menstruation is 35 ml with 10–80 ml considered normal [2]. The menstrual cycle is due to fluctuations in concentrations of estradiol, progesterone, luteinizing and folliclestimulating hormones [3]. These fluctuations can affect platelet count, haemoglobin concentration and other haematological parameters. The menstrual cycle is characterized by cyclical fluctuations in the levels of FSH, LH, estrogen and progesterone.

In developing countries, abnormal uterine bleeding appears to affect about 5–15% of women of reproductive age. It is a major cause of gynecological morbidity, affecting up to one in five women some point during their reproductive life span [4]. Reproductive-aged women of about 9-14% have blood loss that exceeds 80 ml 5and prolonged and excessive bleeding may provoke or exacerbate anemia and in a certain percentage of cases, may eventually be life threatening if left untreated, thus there arises a need to estimate Hemoglobin during the menstrual cycle. The lack of awareness about the potential importance of reducing menstrual flow when women are anemic and lack of knowledge among women about treatment alternatives is of some concern. The maintenance of different blood corpuscles at normal levels during the menstrual cycle is necessary. Therefore, in the present study, hematological modulation in the different phases of menstrual cycle was studied.

2. Materials and Methods
The study protocol was approved by the institutional ethical committee. Fifty subjects were recruited after the informed and written consent. In the present study, apparently healthy fifty female medical students aged between 18-25 years and Normal regular menstrual cycles of 27-33 days with ovulatory cycles were included. Subjects below 18yrs and above 25yrs of age, Subjects with endocrinal & gynecological disorders, chronic diseases, allergic conditions, presence of infection at the time of sampling, subjects with diabetes, pregnancy,

Venous blood sample was collected from the antecubital vein (2 ml) in a disposable syringe between 1- 2 pm to avoid diurnal variation and counting was done within half an hour to avoid variations due to storage. Blood was taken in EDTA bottle and mixed well. The investigations were performed using Hemo auto analyzer-SYSMEX KX-21.

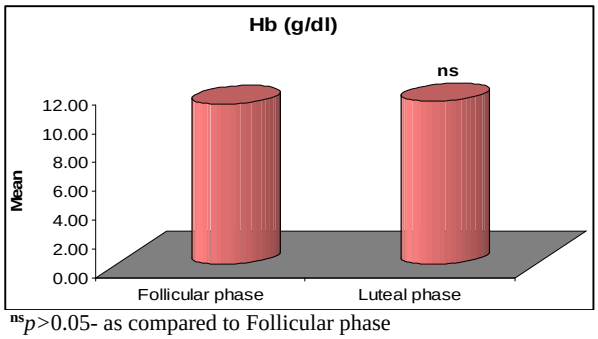
Statistical Analysis: Data was expressed as Mean ± S.D. and was analyzed for statistical analysis using SPSS 17.0 Software. To compare means of two independent groups, student's t- test was used.

Results

In the present study, hematological parameters like Hemoglobin concentration was performed to investigate the modulation of these parameters in different phases of menstrual cycle was studied. All the parameters in follicular and luteal phase were represented. The hemoglobin concentration (g/dl) follicular phase and luteal phase when compared did not show any significant variation.

Table 1: Haemoglobin levels (Mean ± SD) at two phases of menstrual cycle

RBC indices	Follicular phase (n=50)	Luteal phase (n=50)	T value	P value
Hb (g/dl)	11.08 ± 0.88	11.27 ± 0.73	1.39	0.172



^{ns}p>0.05- as compared to Follicular phase

Fig 1: Comparison of mean Hb between two phases of menstrual cycle.

4. Discussion

The human menstrual cycle involves physiological, biochemical, and ECG changes. Haematological and biochemical parameters are the indicators of health and nutritional status of females, which in turn affects its reproductive capability. In the present study, Hemoglobin exhibited a non-significant increase from Follicular to Luteal Phase, which is in agreement with the earlier reports6. Hemoglobin concentration may increase from menstrual phase to secretory phase due to increased erythropoiesis to compensate for the blood loss during menses. The menstrual cycle is affected by so many various factors-e.g., stress and changes in diet and iron. Several other studies showed no significant changes in Hb Concentration various phases of menstrual cycle [10]. There was a pronounced tendency towards an increase in Hb from the early menstrual phase until the postovulatory period, with a subsequent decrease towards the end of the cycle [7, 8]. The cyclic variations act as indicators of iron status and are a potential source of error when iron status is assessed in large population surveys that include women of reproductive age [9].

Some studies shows that hemoglobin concentrations were significantly lower in follicular phase than in the luteal phase [10, 11, 12, 13]. The natural fluctuations in ovarian hormones during the course of the menstrual cycle influence the secretion of hormones that control the volume and content of the vascular space.

This finding is in accordance with our study. The haemoglobin levels obtained were higher during the luteal phase. This could be due to the loss of blood during the menstruation. This would have possibly affected the levels of haemoglobin in red blood cells. The blood loss during menstruation results in a negative iron load in women and increases the risk for developing [14, 15, 16, 17] iron-deficiency anaemia. Other studies indicate postmenopausal women have higher haemoglobin levels than premenopausal women during the luteal phase. This may be due to the high levels of progesterone during the luteal phase in premenopausal women. In addition, it is suggested that variation in the levels of oestrogen and progesterone during the menstrual cycle influences haematopoiesis.

Conclusion: In the present study, it has been found that statistically non-significant variation occurs in haemoglobin levels during the menstrual cycle.

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