

VARIATION IN HAEMOGLOBIN LEVELS DURING MENSTRUAL CYCLE

Surbhi Kotwaney¹ & Pushparaja Shetty²

¹P.G. Student (III Year), ²Professor & HOD, Department of Oral Pathology & Microbiology, A.B. Shetty Memorial Institute of Dental Sciences, Nitte University, Deralakatte, Mangalore - 575 018, Karnataka, India.

Correspondence

Surbhi Kotwaney

P.G. Student (III Year), Department of Oral Pathology and Microbiology,

A.B. Shetty Memorial Institute of Dental Sciences, Nitte University, Deralakatte, Mangalore - 575 018, Karnataka, India.

Mobile : +91 81479 34319 E-mail : surbhi.kotwaney@gmail.com

Abstract

Context : 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 : Fifteen women 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 significant variation occurs in the levels of haemoglobin between the follicular and luteal phases of menstrual cycle.

Keywords : menstrual cycle, haemoglobin, oestrogen, progesterone

Introduction :

Menstrual cycle is cyclic process that occurs in women of childbearing age i.e. between menarche and menopause. During this cycle, secretion of steroid hormones namely, oestrogen and progesterone occur. The average length of menstrual cycle is 28 days, although variation of 21-40 days is normal.¹

The phases of menstrual cycle are pre-ovulatory or follicular phase and post-ovulatory or luteal phase. During the follicular phase, the oestrogen concentration is higher while during the luteal phase, progesterone surge occurs.¹

Haemoglobin is an iron-containing metalloprotein, found in the red blood cells. It is responsible for carrying oxygen to the tissues and carbon-dioxide from the tissues.¹ During menstruation, blood loss of 30-80L occurs. This results in loss of iron from the body.

This may indirectly affect the haemoglobin levels in red blood cells.²

The aim of the study was to assess the variation in haemoglobin levels during the menstrual cycle.

Materials and Methods:

Fifteen females between 18years to 35 years of age were a part for this research. A written consent was obtained from them. All the selected females were non-smokers, non-drinkers, and free from infections. Through questionnaires, the average duration of their menstruation and their menstrual cycle, age, and their diet was collected. For estimation of haemoglobin, whole blood samples were collected in the morning at around 9A.M. on the 4th day of menstrual cycle and approximately four days prior to the menstruation. The study was carried over 3 months. An average of three readings for each phase for an individual was taken. Haemoglobin measurement was carried out using colorimetric method. The data collected during the two phases of menstrual cycle was statistically analysed using Student t-test.

Access this article online

Quick Response Code



Results :

The mean haemoglobin concentration during the follicular phase is 12.88 ± 1.1 g/dl and during the luteal phase is 13.06 ± 0.93 g/dl (Fig. 1). The p-value obtained was 0.041, which means there is significant variation ($p < 0.05$) in the levels of haemoglobin during menstrual cycle.

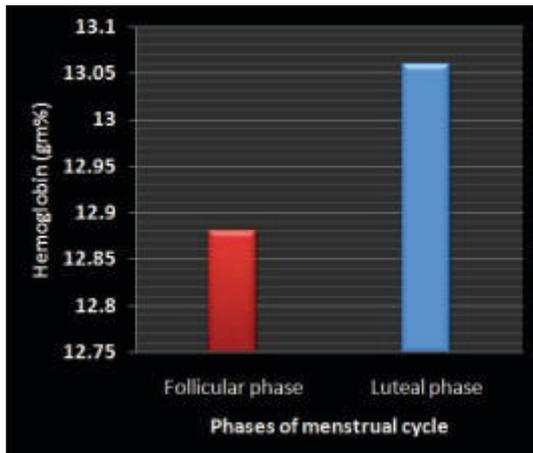


Figure 1 : Comparison of the mean haemoglobin levels in follicular and luteal phases of menstrual cycle

Discussion :

Haem synthesis occurs within the mitochondria. There is no evidence for variation in mitochondria number, ability to synthesize haem, or absorption of iron from the same diet, between males and females. Even the erythropoietin

and thyroxine levels show no variation. The only possible cause for the variation in red blood cell count, haemoglobin and serum ferritin levels amongst males and females is the influence of hormones.³

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 iron-deficiency anaemia.^{4,5,6,7} 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.⁸

Conclusion :

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

References :

- Hall. Guyton and Hall Textbook of medical physiology. 12th Edition. Saunders Elsevier publication.
- Kim I, Yetley EA, and Calvo MS. Variation in iron-status measures during the menstrual cycle. *Am J Clin Nutr* 1993; 58:705-9
- Rushton DH, Dover R, Sainsbury AW, Norris MJ, Gilkes JJH, Ramsay ID. Why should women have lower reference limits for haemoglobin and ferritin concentrations than men? *BMJ* 2001 June; 322:1355-7.
- Silotry N, Nimmagadda HK, and Kumari R. A comparison of haemoglobin levels in women with and without premenstrual syndrome during premenstrual, menstrual and postmenstrual stages. *Int J Biol Med Res.* 2011; 2(4): 1017 – 1022.
- Mangayarkarasi S. Biochemical changes in women during normal and menstruation periods. *Asian J Chem* 1999; 11(1):71-4.
- Duport N, Preziosi P, Boutron-Ruault MC, Bertrais S, Galan P, Favier A, Lafond JL and Hercberg S. Consequences of iron depletion on health in menstruating women. *European Journal of Clinical Nutrition* 2003;57:1169–1175 Hallberg L, Hukthen L, and Garby L. Iron stores and haemoglobin iron deficits in menstruating women. Calculations based on variations in iron requirements and bioavailability of dietary iron. *European Journal of Clinical Nutrition* 2000; 54:650-7.
- Javaid A, Hassan R and Naim T. A comparative study of body weight, haemoglobin concentration, and hematocrit during follicular and luteal phases of menstrual cycle. *J. Med. Sci* 2007; 7(1): 146-9.