



BLOOD LEUCOCYTE COUNT DURING DIFFERENT PHASES OF MENSTRUAL CYCLE

Physiology

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ABSTRACT

Menstrual cycle is the cyclical phenomenon characterized by periodic vaginal bleeding influencing all the systems of the body. Interaction between the reproductive system and immune cells play an important immunoregulatory role. The present study was taken up to study the variations in the blood leucocytes during different phases of menstrual cycle.

Materials And Methods: 50 healthy female subjects in the age group of 13-45 years with normal menstrual cycle of 30 ± 3 days duration participated in the study. Women with irregular periods, chronic disease and with history of drug affecting menstrual cycle were excluded from the study. Total Leucocyte Count (TLC), Total Lymphocyte Count (TLyC), Total Monocyte Count (TMC), Total Granulocyte Count (TGC) were analysed during the menstrual phase, proliferative phase and secretory phase during a single cycle. The data collected was statistically analysed.

Results: The TLC was increased from menstrual phase to proliferative phase which showed decreased number during secretory phase as it paralleled with the increase in total granulocyte count from menstrual phase to highest in proliferative phase as compared to secretory phase but was statistically not significant. The total lymphocyte count was increased in secretory phase and was not significant statistically. The total monocyte count was highest in secretory phase but not statistically significant.

Conclusion: This study aimed to understand the normal variations in the leucocytes during different phases of menstrual cycle which may help in understanding various disorders.

KEYWORDS

Menstrual cycle, Leucocyte count

INTRODUCTION

Menstrual cycle involves structural, functional and hormonal changes in the reproductive system with the periodic vaginal discharge of blood containing degenerated endometrial parts as the only visible external sign. It is associated with the secretion of estrogen and progesterone from the ovaries under the influence of the hypothalamus and pituitary gland¹. Ovarian hormones influence almost all the system of the body². Human and animal studies suggest that there is a change in the distribution of immune cells during different phases of menstrual cycle³. Numerous studies have been undertaken to examine the changes in various types of blood cell counts and hormonal profile in different phases of menstrual cycle, but results have often been variable and contradictory. Hence this study was carried out to assess the variations of the leucocytes in the peripheral blood during different phases of menstrual cycle.

MATERIALS AND METHODS

The present study was approved by Medical Ethics Board, RIMS, Imphal. The nature and purpose of the study were fully explained to the subjects for their full cooperation and informed consent were obtained from all the participants. The prospective study was carried out on 50 healthy female subjects in the age group 13-45 years with normal menstrual cycle of 30 ± 3 days. Cases of irregular periods, chronic disease and with history of drug affecting the menstrual cycle were not included. The estimation of total leucocyte count (TLC), total lymphocyte count (TLyC), total monocyte count (TMC), total granulocyte count (TGC) were done under the following phases of menstrual cycle-

- Menstrual phase (2nd day)
- Proliferative phase (between 9th to 13th day)
- Secretory phase (21st to 24th day)

Blood samples were drawn from antecubital vein (2 ml) in a plastic vial containing EDTA as anticoagulant and investigations were performed using Hematology analyzer-Samsung Labgeo HC10.

Statistical Analysis:

For analytical purpose, statistical techniques like mean, standard deviation were calculated and one-way analysis of variance (ANOVA) was used for significance test whenever found suitable and necessary through SPSS software. Statistical significance is taken to be

at p-value less than 0.05.

RESULTS:

In the present study, estimation of TLC, TLyC, TMC, TGC were performed to investigate the variation of these parameters in different phases of menstrual cycle. All the parameters in different phases of menstrual (MP), proliferative (PP) and secretory phase (SP) were represented in the figures 1 to 4.

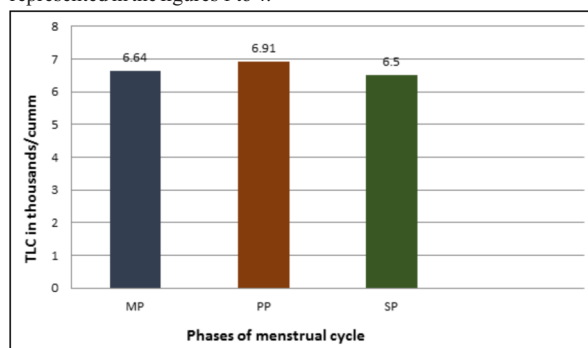


Fig 1. TLC In Different Phases Of Menstrual Cycle

Fig.1 shows that there is an increased in TLC from MP to PP which showed decreased number during SP but the difference is not significant statistically ($p=0.5137$).

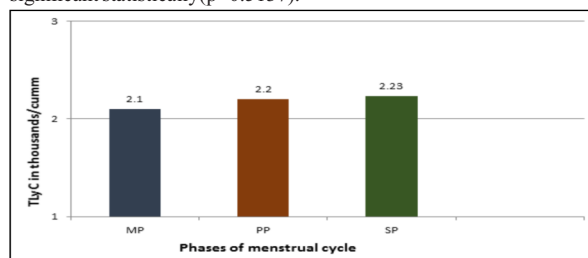


Fig 2. TLyC in different phases of menstrual cycle

Fig. 2: shows that there is a small rise in the TLYC from MP to PP and further small rise from PP to SP but the rise is not significant ($P=0.7134$).

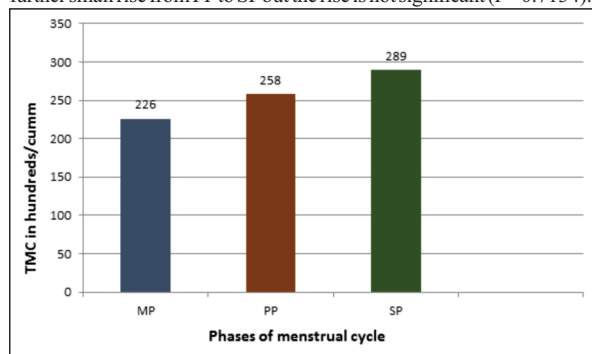


Fig 3. TMC in different phases of menstrual cycle

Fig.3: shows that TMC is lowest during MP and is highest during SP but the difference is not significant ($P=0.0744$).

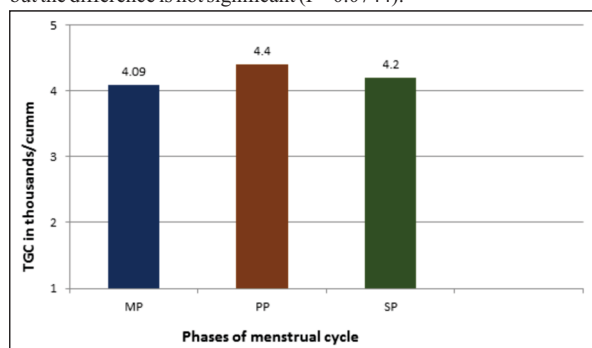


Fig 4 TGC in different phases of menstrual cycle

Fig.4: shows that TGC is highest during PP and is lowest during menstrual phase but the difference is not significant ($P=0.9915$).

DISCUSSION:

The study was carried out to assess the changes in TLC, TLYC, TGC, TMC during three phases of regular menstrual cycle in 50 healthy female subjects in the age group 13-45 years.

The TLC was increased from menstrual phase to proliferative phase which showed decreased number during secretory phase of the menstrual cycle. Similar pattern of variation in TLC during the three phases of menstrual cycle were observed in other studies^{4,5,6}. The TLC was found maximum in PP in comparison to other phases but statistically significant value were not noted in the present study. In other study⁷ total WBC count increases from MP to secretory phases. In several other studies^{8,9,10} TLC exhibit a mild increase around follicular phase but no significant changes were observed similar to the present study. Some studies^{11,12,13,14} reported that there is no change in the number of circulating leukocytes in relation to menstrual cycle. In contrast, Shilpa Nandi et al¹⁵ observed significant changes in TLC during three phases of menstrual cycle.

Many researchers have presented opinions on the cause of fluctuations in leukocyte levels during different phases of menstrual cycle. The changes in leukocyte levels during menstrual cycle is associated with presumptive change in estrogen and the possibility that they are influenced by blood gonadotropic hormones at the time of ovulation or by blood progesterone or body temperature during the later half of the cycle cannot be excluded^{4,5}.

The differential count in the present study revealed that all types of leukocytes showed small variation during the different phases of menstrual cycle. The total granulocyte count was increased during PP in comparison to other phases but not statistically significant. An increased in neutrophil count during PP was reported by Malipatil et al⁶ but not significant statistically. Other studies^{16,17,18,19} showed increased neutrophil % value during the luteal phase in comparison to other phase. Whereas some studies^{4,6} observed a significant fall in eosinophil around mid cycle and premenstrual. According to some studies^{20,21} Estrogen seems to enhance granulocyte proliferation in vitro and probably promote the release of neutrophil from the bone marrow rather than from the marginated pool. The increase in 17 beta estradiol

concentration in circulating pool of blood in SP promote granulopoiesis which in turn increases the granulocyte numbers. The mid cycle and premenstrual falls are probably due to migration of cells from the peripheral blood in to the rupturing follicle of the ovary and in to the ischemic endometrium^{4,6}.

The total lymphocyte count was increased in secretory phase but was not statistically significant. This is in line with the observations of other studies^{6,16,17}. Increase in lymphocyte count during PP was also reported in some studies^{6,18}. Study showed that increase in lymphocyte count during PP and SP compare to MP may be due to increase in the number of Helper T cells, Cytotoxic T cells, Natural killer cells that occur under the influence of steroids²².

In the present study, the total monocyte count was found maximum during SP in comparison to other phases. A significant increase in monocyte during luteal phase than in follicular phase was reported other study¹⁷ and their pattern followed closely that of progesterone. An increased in monocyte count during the PP is also observed in other study¹⁶.

CONCLUSION:

The study showed that there are cyclical fluctuations in the TLC, TLYC, TMC and TGC during the different phases of the menstrual cycle and determining the role of variation in immune cells in the peripheral blood which may help in understanding various disorders occurring in women.

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Conflict of Interest: None declared.

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