

## Variation in Platelet Count during Different Phases of Menstrual Cycle

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### I. Introduction

Menstruation is a physiological process consisting of the disintegration of the surface layer of the endometrium which is associated with the rupture of the blood vessels which irrigate the superficial layer of the endometrium.<sup>1</sup> The menstrual cycle is characterized by cyclical fluctuations in the levels of FSH, LH, estrogen and progesterone.<sup>2</sup> Platelets constitute the first hemostatic component to mobilize in order to stop the bleeding. Platelet function is periodically altered during the ovarian cycle due to the influence of progesterone and estrogen on Von Willibrand factor concentrations. Demonstrable fall in the platelet count at the time of menstruation and the simultaneous lowering of capillary resistance have given rise to the speculation that menstruation is to be regarded as a physiological thrombopenia with a general liability to bleeding as a latent haemorrhagic diathesis. The correlation of mid-cycle peak elevation of platelet count with the basal temperature shift from lower to higher phase, led to the belief that the former may be more accurate indication of ovulation than the latter.<sup>3</sup> The present study was carried out in an effort to determine if there was any regular variation in the number of blood platelets during the menstrual cycle in normal healthy women.

### II. Materials And Methods

The present study was carried out on 50 healthy female healthy subjects in the age group 13-45 years with normal menstrual cycle of  $30 \pm 3$  days. Cases of irregular periods, chronic disease and with history of drug affecting the menstrual cycle were not included. The estimation of total platelet count (PC), platelet percentage (PCT), mean platelet volume (MPV), and platelet distribution width (PDWc) were done under the following phases of menstrual cycle

- a) Menstrual phase ( 2<sup>nd</sup> day)
- b) Proliferative phase ( between 9<sup>th</sup> to 13<sup>th</sup> day)
- c) Secretory phase ( between 21<sup>st</sup> to 24<sup>th</sup> day)

Blood samples were drawn from anticubital 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 Anova was adopted for significance test. Statistical significance is taken to be at p-value less than 0.05.

### III. Results

In the present study, estimation of PC, PCT, MPV, PDWc were performed to investigate the modulation of these parameters in different phases of menstrual cycle. All the parameters in menstrual (MP), proliferative (PP) and secretory phase (SP) were represented in the figures 1 to 4.

Fig 1. Platelet count in different phases of menstrual cycle

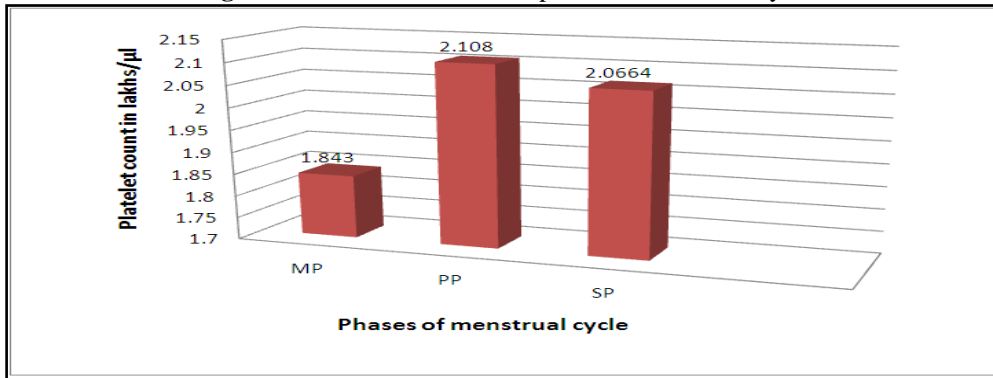


FIG 1. shows that there is significant fall in platelet count during MP( $p= 0.0276$ ) which is followed by a rise during PP. During SP, platelet count is increased as compared to MP but the rise is lower than during PP.

FIG 2. PCT in different phases of menstrual cycle

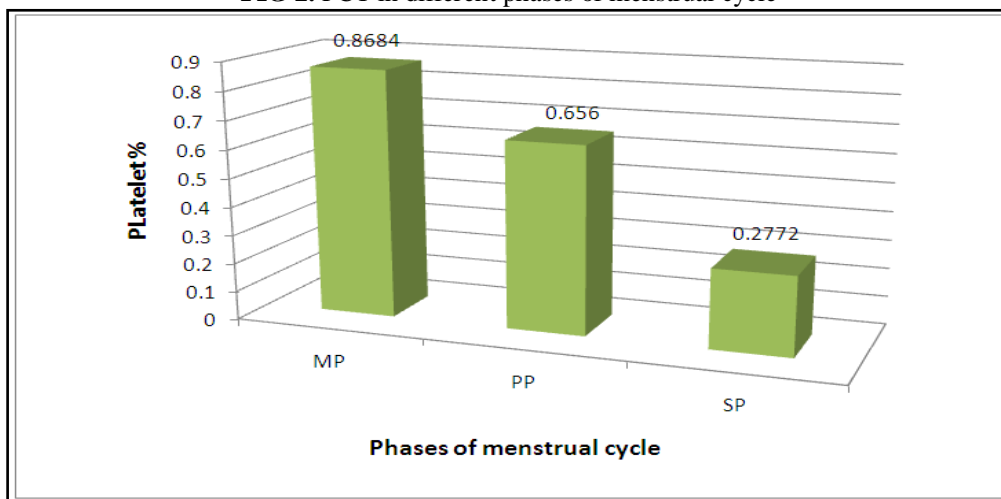


FIG. 2 shows that PCT shows rise during MP but it was not significant( $p= 0.5605$ )

FIG. 3 MPV in different phases of menstrual cycle

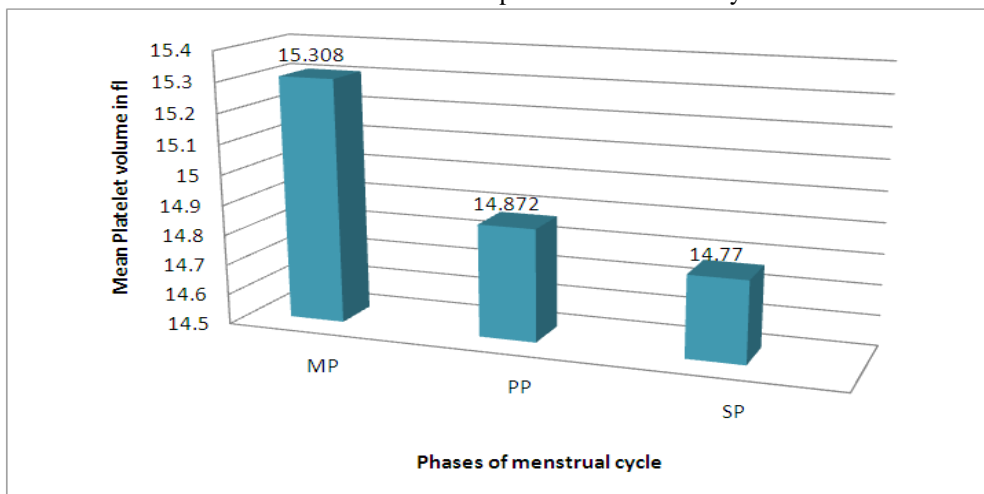
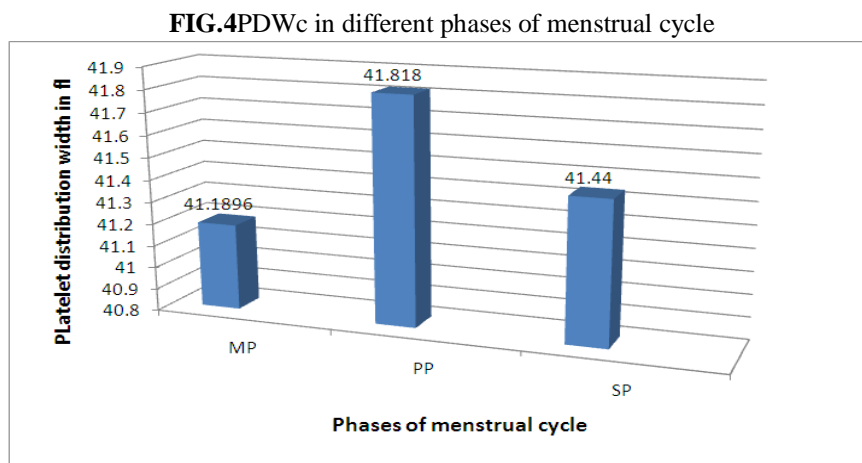


FIG. 3 shows that MPV is highest during MP but it was not significant ( $p= 0.7628$ )



**FIG. 4** shows that PDWc is lowest during MP but it was not significant ( $p= 0.6038$ )

#### IV. Discussion

The menstrual cycle, that is the interval between the onsets of two successive menstruations is under the control of hypothalamic-pituitary-ovarian(HPO) axis. It is also now recognized that important systemic as well as haematological changes are accompanying the various phases of menstrual cycle.<sup>4</sup>

In our study, we estimated total platelet count, platelet percentage, mean platelet volume and platelet distribution width in different phases of menstrual cycle. The total platelet count was found to be minimum during the menstrual flow. Thereafter, it rose during the proliferative phase. The figure in the secretory phase is higher than that in the menstrual phase but the rise is lower as compared to the proliferative phase. The fall in the levels of platelets at the onset of menstruation may be related to the fall in level of corpus luteum hormones and parallelism may be said to exist between the oestrin curve and platelet curve during the menstrual period. The decrease in the platelet levels at the onset of menstruation may be due to toxic reaction( menotoxin) or due to an endocrine reaction via the spleen or haemopoietic system.<sup>3</sup>

A mid-cycle peak elevation in platelet count, followed by a gradual decline may be due to luteal hormone inhibiting the spleen from releasing platelets.<sup>5,6</sup> Some believed that absorption of necrotic endometrium caused a systemic reaction with a postmenstrual increase of platelets.<sup>7</sup> Some found that the platelet count was elevated significantly during the mid-cycle. The cause of this peak lies in the physiological stress mechanism occurring in the wake of ovulation with an alarm reaction and discharge of corticosteroids, as injections of corticotrophin is followed by an increase in platelet count.<sup>8</sup>

Thus, the variations in the levels of platelet during different phases of menstrual cycle may be explained by variations in the levels of ovarian hormones, menotoxin( toxic reaction) and toxic resorption of necrotic material from raw endometrial surface or due to an endocrine reaction via the spleen on haemopoietic system or due to corticosteroids. However, in contrary to above findings some studies have reported mild changes in platelet count, but no statistically significant changes to be observed during different phases of menstrual cycle.<sup>9</sup>

#### V. Conclusion

This study revealed that the total platelet count was significantly lower in menstrual phase compared to proliferative phase which shows higher level relative to secretory phase.

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