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SIGNIFICANCE OF BLEEDING TIME AND CLOTTING TIME IN VARIOUS PHASES OF MENSTRUAL CYCLE

Gynaecology

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ABSTRACT

Menstruation related periodic bleeding from the blood vessels, at the time of shedding of the uterine mucosa has focussed interest, more especially in the haematological changes during different phases of menstrual cycle.. Aim of the study: The estimation of bleeding time & clotting time in different phases of menstrual cycle. Materials and Methods: The study was conducted on 30 female subjects in the age group of 14 - 35 years. Bleeding time estimated by Duke's filter paper method and clotting time by Wright's capillary tube method which were measured in three phases during a single menstrual cycle and were followed up. Results: mean bleeding time at secretary phase was significantly ($P< 0.05$) less as compared to menstrual and proliferative phases. Whereas, mean clotting time at proliferative phase was 2.16±2.28 minutes, which was comparatively less than menstrual and secretary phases with statistical significant difference.

KEYWORDS

Menstrual Cycle; Bleeding Time; Clotting Time; Hemostasis

Introduction

Physiological variations have been observed in several parameters in the human body as part of the normal circadian rhythm, which could be seasonal or diurnal1. The human menstrual cycle involves complex and regular anatomical and physiological changes over an approximate monthly time periods under the control of the hypothalamic pituitary-ovarian (HPO) axis2. The endometrium is stimulated and regulated by the ovarian steroid hormones mainly estrogen and progesterone which in turn are controlled by an integrated HPO axis, through the release of follicle stimulated hormone (FSH) and luteinizing hormone (LH)2. The activities and associated fluctuations in the levels of these hormone leads to the different phases encountered in the menstrual cycle divided into; the menstrual, follicular/ovulatory, and luteal phases.

It is well known that onset of menstruation is preceded by sudden decrease in blood level of estrogen and progestin about 2 days before and cessation of bleeding occurs with regaining of estrogen levels3. Fibrinolysin present in this blood does not allow clotting and stasis of blood in uterus. Flow stops as a result of combined effect of vasoconstriction, myometrial contraction, and local aggregation of platelets3.

The prevalence of menorrhagia in adolescent populations with bleeding disorders varies from 14% to 48%. Among the inherited bleeding disorders, platelet function defects are also an important cause of menorrhagia4.

Serum proteins bind sex steroids and regulate activity of menstrual cycle. The sex steroids have an anabolic effect. Estrogen causes positive nitrogen balance due to growth promoting effect which causes slight increase in the total body proteins.8Progesterone exerts anabolic effect & this partly accounts for some of the weight gain5. Studies conducted during menstruation show fibrinogen level; coagulation factors II, VII, and X; and platelet retention are lower in menstrual phase than in luteal phase and fibrinolytic activity is higher in menstrual phase6

Estrogen receptor-b (ER-b) protein is present in glycoprotein IIb +ve megakaryocytes and platelets. Estradiol synthesized in megakaryocytes triggers pro-platelet formation. This suggests that estrogen not only increases coagulation factors but also promotes formation and activation of platelets7, 8. This shows that repeated change in hemostatic mechanism might be associated with each phase of menstruation. The purpose of this study was to know the significance of bleeding time & clotting time during normal menstruation.

Materials & methods

This was an observational study conducted among 30 female volunteers aged 14 - 35 years, having regular menstrual cycle. Patients were excluded those who are having a history of irregular menstrual cycles, bleeding or clotting disorders, recent history of viral infections and any major illness and hospitalization. Proper informed written consent of the volunteers was taken.

Detailed menstrual and family history was collected. Bleeding time estimated by Duke's filter paper method and clotting time by Wright's capillary tube method which were measured in three phases during a single menstrual cycle as: i) Menstrual phase (2nd day), ii) Proliferative phase (between 9th to 13th day) & iii) Secretory phase (between 21st to 24th day).

Results

Comparison of Bleeding Time (BT) (Table 1) & Clotting Time (CT) (Table 2) between three phases of menstrual cycle, that is Menstrual phase (MP), Proliferative phase (PP), and Secretary Phase (SP) using ANOVA with Tukeys' post hoc Test. There is statistically significant difference among 3 Phases for Bleeding Time (BT) with $p <0.001$.
Mean values of MP was higher than PP & SP which was statistically significant. During menstrual phase, proliferative phase & secretory phase bleeding time ranged from 3.3 to 5.2 minutes, 3.3 to 4.2 minutes and 4.2 to 3.3 with minutes (Table 1). Further During menstrual phase, proliferative phase & secretory phase clotting time ranged from 2.1 to 3.8 minutes, 1.8 to 3.1 minutes and 1.9 to 2.4 with minutes (Table 2). Bleeding time was increased in all the phases during menstrual cycle (Graph 1).

Table 1: Comparison of Bleeding Time (BT) between three phases of menstrual cycle

	Menstrual phase (MP)	Proliferative phase (PP)	Secretary phase (SP)	ANOVA (p value)
MEAN	4.07000	3.94667	3.85333	0.046*
(±) SD	0.422758	0.275097	0.278832	
Range	3.300- 5.200	3.300 -4.200	4.200 - 3.300	

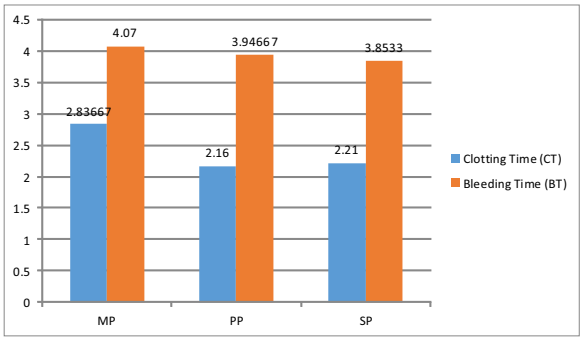
*Statistically Significant

Table 2: Comparison of Clotting Time (CT) between three phases of menstrual cycle.

	Menstrual phase (MP)	Proliferative phase (PP)	Secretary phase (SP)	ANOVA (p value)
MEAN	2.83667	2.16000	2.21000	<0.001*
(±) SD	0.391710	0.284787	0.160495	
Range	2.100 - 3.800	1.800 -3.100	1.900 - 2.400	

*Statistically Significant

Graph 1: Clotting Time (CT) & Bleeding Time (BT) between three phases of menstrual cycle.



Discussion

In our study, we found that mean bleeding time at secretary phase was significantly ($P< 0.05$) less as compared to menstrual and proliferative phases. It might be the combined effect of increased platelet count as well as accumulation of estrogen.

In our study, we observed that mean clotting time at proliferative phase was 2.16±2.28 minutes, which was comparatively less than menstrual and secretary phases with statistical significant difference ($P<0.05$). Clotting time according to Aara S etal9, was increased in proliferative and secretory phase as compared with menstrual phase which was in contrast to our results. Similarly Gaur S et al10 too observed low clotting time during menstrual phase and highest during the proliferative phase which was in contrast to our results. A cyclic variation of factor VIII is reported during menstrual cycle.

Studies reported that lowest Von-Willbrand factor (vWF) levels during menstruation or early proliferative phase11. (Roell A) But few studies reported no cyclic variation of vWF. A cyclic variation of factor VIII is reported during menstrual cycle12. The lowest levels were found during menstruation and early proliferative phase.

Our observations indicate that primary and secondary hemostatic mechanism activities are at their high in the proliferative phase than in the secretary and menstrual phases. Hence, ideal timing of hemostatic testing seems to be the menstrual and early proliferative phase.

Duke's filter paper method for bleeding time and Wright's capillary tube method for clotting time, though easy, rapid, inexpensive, and bedside screening tests, still are not very sensitive tests and are subjected to show inconsistent changes due to many reasons. A larger sample including both normal and subjects with menorrhagia could have been evaluated simultaneously to validate the above study findings.

Conclusion

We conclude that bleeding time at secretary phase was significantly less as compared to menstrual and proliferative phases, whereas clotting time at proliferative phase was was comparatively less than menstrual and secretary phases with statistical significant difference. Hence, ideal timing of hemostatic testing seems to be the menstrual and early proliferative phase.

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