



ANTHROPOMETRIC PARAMETERS AND HAEMOSTATIC REGULATES IN MENSTRUAL CYCLE

Physiology

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ABSTRACT

Background: During the various phases of menstrual cycle, systematic hematological changes has been reported and various significant factors plays important role in governing the menstrual cycle which includes hormonal fluctuations, clinical conditions, body mass index (BMI), and genetics. There are various factors involved for the prevalence of menstrual disorders such as alcohol consumption, caffeine, stress, smoking, ethnicity, BMI, and malnutrition due to the poverty. **Methods:** Different anthropometric parameters were assessed under the different phases of menstrual cycle. Among haemostatic regulates, bleeding time was estimated by Duke's method and Clotting time was estimated using capillary tube method among group of 40 females between the age group of 18-25 years, The correlation of Bleeding and clotting time with Anthropometric parameters in different phases of menstrual cycle was assessed by Pearson Correlation test and P- value of less than 0.05 was considered statistically significant. Results: Correlation of Bleeding and clotting time with different anthropometric parameters in different phases of menstrual cycle was done using Pearson Correlation test. However, the observations did not reached the level of statistical significance. **Conclusion:** Hematological parameters, viz BT and CT were also were compared between different phases of menstrual cycle. Mean BT at ovulatory phase was significantly ($P < 0.001$) less as compared to other phases of menstruation cycle. And the inter-group comparison of mean BT between different phases of menstrual cycle also shows significant change.

KEYWORDS

Anthropometric Parameters, Haemostatic Regulates, Menstrual Cycle

INTRODUCTION

Menstruation cycle is comprehend of two cycles namely ovarian cycle and uterine cycle based on occurrences in the ovary and in the uterus respectively.^[1] The ovarian cycle comprised of three phases follicular phase, ovulation, and luteal phase. Menstrual, proliferative, ovulatory and secretory phases are comes under uterine cycle. The endocrine system is fully governs the both cycles.^[2]

During the various phases of menstrual cycle, systematic hematological changes has been reported.^[3] and various significant factors plays important role in governing the menstrual cycle which includes hormonal fluctuations, clinical conditions, body mass index (BMI), and genetics.^[4]

The weight and fat content is the major route cause for menstrual disorders .There are various factors involved for the prevalence of menstrual disorders such as alcohol consumption, caffeine, stress, smoking, ethnicity, BMI, and malnutrition due to the poverty^[5,6,7,8]. The hormonal imbalance due to uneven alterations in thyroid hormone release and polycystic ovarian syndrome also plays a significant role in developing menstrual disorders.^[9] Among all the above factors, the most control over body mass index, or BMI. Having a high or low BMI may leads to irregular, painful and absence of menstruation.^[10]

Several reports have been confirmed that the bleeding and clotting system is dependent on the hormonal changes during menstrual cycle.^[11] Hemostasis is sudden stoppage of bleeding at the injured or damaged site. The series of steps involved in this process includes vasoconstriction, platelet plugs formation, clot formation, clot retraction and clot lysis.^[12-15] Bleeding ordinarily lasts for 3 to 4 minutes.^[16] Clotting time (CT) is the time period from the inception of bleeding to first fibrin thread formation. Normal value of clotting time is 5 to 8 minutes.^[17]

The most common hereditary bleeding disorder is Von-Willebrand disease (VWD), Menorrhagia or heavy menstrual bleeding occurs in the majority of women with bleeding disorders and adversely affects quality of life. The American college of Obstetrics and Gynecology has recommended that women with heavy menstrual bleeding have diagnostic testing for bleeding disorders.^[5]

Though various researchers has been showed the correlation of menstrual pattern with BMI and also BT, CT variations during menstrual cycle. The detailed study on correlation of anthropometric

parameters with BT and CT in menstrual cycle is not yet fully elucidated. Thus, the current study was aimed to study the anthropometric parameters such as BMI, weight, and WHR affects the menstrual cycle. The major focus of the present investigation is to demonstrate the BT and CT variations during menstrual cycle. The results of this study would highly contribute for effective understanding on the root causes of menstrual disorders.

METHODOLOGY

A group of 40 females between the age group of 18-25 years, willing to participate in the study and with regular menstrual cycle. (cycle duration between 21 to 35 days and menstrual phase between 2 to 6 days) using simple random sampling method were selected for the study. However Females with a known case of hormonal disorder, using hormonal oral contraceptive pills, history of alcohol consumption or smoking or known case of any haematological disorder, any history of chronic systemic or gynaecological disorder were excluded from the study. The study was conducted in the Department of Physiology, Teerthanker Mahaveer Medical College and Research Centre, Moradabad (U.P.) over a period of 12 months January to December 2016 after approval from the collage research committee.

Measurement of anthropometric parameters

The following parameters namely Height, Weight, BMI, Waist circumference, Hip circumference, Waist Hip ratio, Bleeding Time & Clotting Time were assessed under the different phases of menstrual cycle1. Menstrual phase (2 nd day) 2. Proliferative phase (9th days after 1st sample) 3. Ovulatory phase (14th days after 2nd sample) 4. Secretory phase (8 days after 3rd sample)

- Height was measured in a standing position, without shoes, using stadiometer to nearest of 1 cm. Weight was measured using electronic weighing machine to the nearest of 100 gm with subjects standing without shoes and wearing light clothes.^[18] Body mass index (BMI) was calculated in kg/m² using the following formula: BMI = Weight (kg) /Height (meter²) Waist circumference was measured midway between iliac crest and the lower most margin of ribs with a non-stretchable measuring tape, without applying pressure on the body surface and Hip circumferences was measured around the widest portion of the participant's buttocks.^[19,20,21] Waist-Hip Ratio (WHR) was calculated in centimetres by using following formula: WHR = WC (cm)/ HC (cm)^[19,20,21]

Measurement of Bleeding and Clotting time

Bleeding time was estimated by Duke's method using Whatman filter paper in which a puncture was made on fingertip using aseptic technique and the initial time was noted once the blood first appeared. Then the blood is carefully blotted every 30 seconds without touching the wound portion and the time was recorded carefully.^[22]

Clotting Time was estimated using capillary tube method which involves collection of blood in a capillary tube that does not contain anticoagulant. The time was noted when the blood first enters the tube and after filling the tube it was kept in palm for 1 min (to keep at body temperature). The outer surface of the capillary is carefully wiped and every 30 seconds a piece of the tube was broken (about 1 cm). The time was recorded carefully when a strand of fibrin (5mm) appears between the two pieces of capillary tube.^[22,23]

Data Entry & Statistical Analysis

- Data analysis was done using Statistical Package for the Social Sciences (version 23)
- The data for all the parameters analyses was expressed as Mean $\pm$ S.D.
- The correlation of Bleeding and clotting time with Anthropometric parameters in different phases of menstrual cycle by Pearson Correlation test and P- value of less than 0.05 was considered statistically significant.

Results

Table1: The correlation of Bleeding and clotting time with different anthropometric parameters in Menstrual phase (N=40)

Menstrual phase	Pearson Correlation BT (sec)	BT (sec) p-value	CT (sec) Pearson Correlation	CT (sec) p-value
WEIGHT (Kg)	-0.004	0.982	0.080	0.625
HEIGHT (cm)	0.158	0.331	0.208	0.198
BMI	-0.092	0.574	-0.023	0.887
Waist (cm)	0.035	0.831	-0.041	0.802
HIP (cm)	0.022	0.891	0.088	0.587
WHR	0.010	0.951	-0.174	0.283

p value: <0.05 (significance)

Table 1 shows the correlation of Bleeding and clotting time with different anthropometric parameters in Menstrual phase using Pearson Correlation test. However, the observations did not reached upto the level of statistical significance.

Table 2: The correlation of Bleeding and clotting time with different anthropometric parameters in Proliferative Phase (N=40)

Proliferative Phase	Pearson Correlation BT (sec)	BT (sec) p-value	CT (sec) Pearson Correlation	CT (sec) p-value
WEIGHT (Kg)	-0.162	0.318	0.053	0.745
HEIGHT (cm)	-0.134	0.411	-0.046	0.776
BMI	-0.0141	0.386	0.055	0.734
Waist (cm)	-0.233	0.149	-0.077	0.636
HIP (cm)	-0.134	0.411	0.076	0.642
WHR	-0.064	0.693	-0.090	0.579

p value: <0.05 (significance)

Table 2 shows the correlation of Bleeding and clotting time with different anthropometric parameters in Proliferative Phase using Pearson Correlation test. However the association was not statistically significant.

Table 3: The correlation of Bleeding and clotting with different anthropometric parameters in Ovulatory Phase (N=40)

Ovulatory Phase	Pearson Correlation BT (sec)	BT (sec) p-value	CT (sec) Pearson Correlation	CT (sec) p-value
WEIGHT (Kg)	-0.141	0.387	-0.106	0.514
HEIGHT (cm)	-0.033	0.838	0.075	0.644
BMI	-0.166	0.305	-0.226	0.160
Waist (cm)	-0.190	0.240	-0.209	0.196
HIP (cm)	-0.206	0.202	-0.128	0.430
WHR	-0.020	0.903	-0.152	0.350

p value: <0.05 (significance)

Table 3 shows the correlation of Bleeding and clotting time with different anthropometric parameters in Ovulatory Phase using Pearson Correlation test. However the association was not statistically significant.

Table 4: The correlation of Bleeding and clotting time with different anthropometric parameters in Secretory phase (N=40)

Secretory phase	Pearson Correlation BT (sec)	BT (sec) p-value	CT (sec) Pearson Correlation	CT (sec) p-value
WEIGHT (Kg)	-0.087	0.592	-0.023	0.889
HEIGHT (cm)	0.300	0.060	0.093	0.566
BMI	-0.237	0.140	-0.097	0.552
Waist (cm)	-0.043	0.790	0.035	0.829
HIP (cm)	-0.057	0.725	0.202	0.212
WHR	-0.020	0.635	-0.114	0.482

p value: <0.05 (significance)

Table 4 shows the correlation of Bleeding and clotting time was done with different anthropometric parameters in Secretory phase using Pearson Correlation test. However, the observations did not reached upto the level of statistical significance.

DISCUSSION

The present study is aimed to Study the Correlation of Anthropometric Parameters with BT and CT in different phases of Menstrual cycle. The study was conducted in the Hematology and Clinical laboratory of Department of Physiology, Teerthanker mahaveer medical college and research centre, Moradabad (U.P.) on 40 females between age group of 17-25 years.

Hormonal fluctuations, genetics, serious medical conditions, obesity and body mass index influence the regularity and flow of regular menstrual cycle in women and it is experience that absence of menstruation, irregular menstruation and painful menstruation due to low or high BMI.^[24-25] Obesity and overweight were measured by using the Body Mass Index (BMI) and Waist and hip circumference (WHR) (Anthropometric measurements includes weight, height, waist and hip circumference).^[26]

Indirect evidence suggested that hormonal fluctuation during the menstrual cycle also affect the bleeding and clotting system.^[27]

Golub et al (1965) reported among sixty-nine females who kept daily record of their body weight prior to menstruation while 43.5% of them experienced their highest weight during the first day of menstruation. The control group was reported to experience a slight increase in weight (<500g) five days prior to the onset of menses. Similarly, a fluctuation in daily weight of 0.59 to 2.07 kg in women throughout the menstrual cycle was reported.^[28]

Sylvia Kirchengast (2003) et al studied changes of the body weight and waist-to-hip ratio during menstrual cycle and 32 healthy young women is age between 19- 30 year were included. Found that body weight increased only slightly during the second cycle half and marked decrease in WHR around at the of ovulation in all subject who advertised average cycle length and a successful ovulation could be assumed.^[29]

Mary Grace Lasquety et al (2012) studied the influence of BMI on the menstrual cycle on 244 women and concluded that obesity is most common factor for shortening the luteal phase and lowers the ovulatory cycle, which highly accounted for infertility.^[30]

Balasubramaniam et al (1980) concluded that increase of platelet count could be the valid reason for shortening of the bleeding time during the mid-cycle.^[31] Jose angel et al (2013) studies variations of bleeding time and clotting time during menstrual cycle among forty female college students (mean age of 21 $\pm$ 2). On contrary they found the increase in mean value of bleeding time from menstrual phase to secretory phase. Bleeding time values is higher in secretory phase but it is not statistically significant.^[32]

Yogita D Sulaxane et al (2015) studied cyclic changes in BT and CT during the menstrual cycle. Bleeding time at follicular phase was

significantly ($P < 0.05$) lower than menstrual and luteal phases.^[33]

S.Gaur et al (1982) studied Fibrinolytic activity, fibrinogen content, prothrombin time and clotting time in a group of 18 medical students in different phase of menstrual cycle. Prothrombin time and clotting time was increased during pre-ovulatory phases, in subsequent phases all the parameters decreased gradually.^[34]

Rajnee et al (2010) studied the effect of menstrual cycle on hematological parameters among 30 healthy female in age group of 18 to 23 years. The clotting time was taken on the 2nd, 11th, 14th and 22nd day of menstrual cycle. It was concluded that clotting time not significantly varied during all the phases of menstrual cycle. Clotting time was least around the mid-cycle and it increases during secretory phase.^[35]

Jose angel et al (2013) studied the variation in bleeding and clotting times during menstrual cycle among forty healthy female (mean age 21 ± 2) There was no significant variation in clotting time observed during all the phases of menstrual cycle. There is a slight improvement was noticed from proliferative phase to secretory phase, but it is not statistically significant.^[35]

Shaugfta Aara et al (2016) studied hematological parameters in various phases of menstrual cycle in 20 female with age group of 18-22 years over a period of 1 year. On the contrary to our study they found that difference in clotting time during menstrual versus proliferative phase was statistically significant. [36]

Limitations

- Bleeding time and clotting time were assessed using Duke's filter paper and Wright's capillary tube method respectively which are cost effective methods and easy to handle But accuracy of readings may vary owing to subjective errors.
- Anthropometric parameters such as weight, BMI, waist circumference, hip circumference and WHR must be studied in more than one menstrual cycle.
- More wider range of results could have been obtained with a larger sample size

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Ethical approval: The study was approved by the Institutional Ethics Committee

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