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Original Research Article

PULSE AND BLOOD PRESSURE INDICES VARIATION DURING DIFFERENT PHASES OF MENSTRUAL CYCLE: AN OBSERVATIONAL STUDY

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ABSTRACT:

Introduction: The most important attributes of female body which makes it possible for procreation, is menstrual cycle. In proliferative phase estrogens gradually increase, causing Follicle stimulating harmone and Luteinizing harmone to peak, whereas progesterone remains low throughout. The secretory phase is dominated by the actions of estrogen and progesterone. Reproductive hormones may modulate cardiovascular function through a number of mechanisms.

Aim of study – To assess the variation in cardiovascular function using recording of pulse and blood pressure indices in different phases of menstrual cycle in females having normal menstrual cycle.

Material And Method – – 50 apparently healthy female aged between 20-25 years were selected for the study and pulse and blood pressure was recorded using automatic blood pressure monitor during the different phase of menstrual cycle as follows: a)Menstrual phase(MP) (2nd day) b)follicular phase(PP) (11th day) c) secretory phase(SP) (22nd day).

Results – After statistical analysis (paired t-test) the finding of study was decrease in systolic BP and mean BP during follicular phase as compared to menstrual phase. But there was significant decrease in diastolic BP and mean BP during secretory phase as compared to menstrual phase. Though there was no significant difference in pulse rate but significant change in pulse pressure between follicular and secretory phase has been shown in present study.

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Conclusion – The effect of endogenous change in hormonal which are the physiological changes during different phases of menstrual cycle supports the result of study.

KEYWORDS : : Menstrual cycle, Menstrual phase,follicular phase, Secretory phase, Systolic BP, Diastolic BP, Pulse Pressure, Mean BP.

Introduction: Commencement of first menstrual cycle is menarche and age of menarche is usually between 12-15 years of age. Uterine or endometrial cycle and ovarian cycle are considered in a menstrual cycle which is due to two different sites of changes: in uterine endometrium and in ovaries respectively. proliferative and secretory phase are the phases of ovarian cycle. Due to change in Follicular stimulating harmone there is gradual rise in level of estrogen during proliferative phase and it again shows effect on Follicular stimulating harmone and LH levels. In duration of proliferative phase progesterone level remains low which increases during secretory phase of ovarian cycle but estrogen is also in action in both phases. Menstrual phase, follicular phase and secretory phase condemn endometrial cycle. Growth of endometrium during follicular phase is mediated by estrogen, and maturation of endometrium occurs during secretory phase of endometrial cycle. At the end of cycle decreasing levels of sex steroids halt endometrial lining growth. If conception does not occur, the endometrial lining is been shaded and starting of the next cycle with menstrual phase occurs.[1] Because of menstrual cycle a female body has got most important attribute of procreation. It is a cycle of natural changes in uterus and ovaries and these changes are meant for sexual reproduction.[2,3] facilitator action in hypothalamo hypophyseal ovarian axis regulates the biological activity of menstrual cycle.[4] Reproductive hormones have effect on hypothalamic pituitary adrenal and sympatho adrenal medullary systems and activation of these systems modulate the cardiovascular functions. Marked decrease in total peripheral resistance and a significant decrease in mean arterial pressure in mid secretory phase is been noticed.[5,6] Two major indicators of cardiovascular function of the body are Blood Pressure and Pulse rate. Changes in the level of reproductive hormones in different phases of menstrual cycle affects the cardiovascular functions according to the change in levels of hormones.[7] Cardio protective nature of estrogen is may be due to its vessel dilator effect. This vessel dilator actions are peripheral as well as central. Functionally competent estrogen receptors have been identified on vascular smooth muscle and endothelial cells and these are responsible for action of estrogen peripherally.[8] Cyclical changes in sex steroid profile in females can have effect on physical capacity due to effect on cardiovascular and respiratory function.[9] There is continuous change of endogenous sex hormones during menstrual cycle. Estrogen starts to increase in mid of proliferative phase and reach to peak just before ovulation and in mid-luteal phase estrogen and progesterone both are elevated .[10] In the proliferative phase, estrogen effect on cardiovascular or myometrium receptor is up-regulation of the receptors.[11] The natural progestin has either neutral or depressor effect on blood pressure and decrease in blood pressure with the progression of pregnancy which has got positive correlation with increase in level of progesterone. Estrogen administration act through increase in prostaglandin I2 and nitric oxide synthesis and promotes dilatation of vessels.[12]

Aim: The aim of the study is to assess the variation in cardiovascular function using recording of pulse and blood pressure indices in different phases of menstrual cycle having normal menstrual cycle.

Study Design: observational analytical study.

MATERIALS AND METHOD: **Sample Size** – 50 apparently healthy female aged between 20-25 years has been selected for the study. Duration Of Study – 5-10 months

Inclusion Criteria – 1. Normal regular menstrual cycles of 27-33 days. **2.**Subjects who gave consent for examination and recording of ECG in different phases of menstrual cycle.

Exclusion Criteria –1. Subjects below 20 yrs and above 25yrs of age. **2.** Subjects with endocrinal & gynecological disorders, chronic diseases and allergic conditions. **3.** Subjects with Diabetes mellitus and hypertension. **4.** lactating females. **5.** Subjects with irregular menstrual cycle.

Method – Participants were re-explained about the study and informed consents were taken. They were informed about the history and general examination prior to recording of pulse and Blood pressure. According to the phases of menstrual cycle candidates have undergone the recording of pulse and BP.

Blood Pressure and pulse recording was done during the Phases of Menstrual cycle:

1) Menstrual phase (MP) - (2nd day),

2) Proliferative phase (PP) - (11th day),

3) Secretory phase (SP) - (22nd day)

Recording of Blood Pressure: Blood pressure and pulse were recorded automatic thrice with interval of five min in between and then average of readings were taken. Statistical analysis was done by using statistical online calculator using openepi.com for paired t-test and Microsoft excel to calculate mean value. The p-value of 0.05 considered statistically significant.

Observation & Result:

Table:1

Average age (years)	Average Height (cm)	Average weight (Kg)	Average duration of Menstrual cycle (days)
22.47	152.34	50.04	3-4/26-30

ISSN 2515-8260 Volume 09, Issue 07, 2022

Table: 2
Average Of Observations Of Different Parameters

Parameters	Menstrual phase	Proliferative phase	Secretory phase
Pulse (beats/min)	81.24	85.85	82.20
BP Systolic (mmHg)	110.2	106.36	110.5
BP Diastolic (mmHg)	74.88	72.56	70.9
Pulse Pressure (mmHg)	40.23	38.89	42.6
Mean Arterial Pressure (mmHg)	82.45	82.65	83.43

Table: 3
Statistical analysis of Paired t-test of different parameters:

Parameters	Menstrual Phase (Average)	Proliferative Phase (Average)	SD (+/-)	p-value	Remark
Pulse	81.24	85.85	3.09	0.45	NS
Systolic BP	110.2	106.36	1.50	0.001	HS
Diastolic BP	74.88	72.56	1.67	0.22	NS
Pulse Pressure	40.23	38.89	0.89	0.56	NS
MAP	82.45	82.65	1.10	0.005	HS

HS= HIGHLY SIGNIFICANT NS= NON SIGNIFICANT

Table : 4 Menstrual Phase Vs Secretory Phase

Parameters	Menstrual Phase (Average)	Secretory Phase (Average)	SD (+/-)	p-value	Remark
Pulse	81.24	85.85	2.581	0.79	NS
Systolic BP	110.2	106.36	1.369	0.22	NS
Diastolic BP	74.88	72.56	1.535	0.06	NS
Pulse Pressure	40.23	38.89	2.007	0.53	NS
MAP	82.45	82.65	1.14	0.03	HS

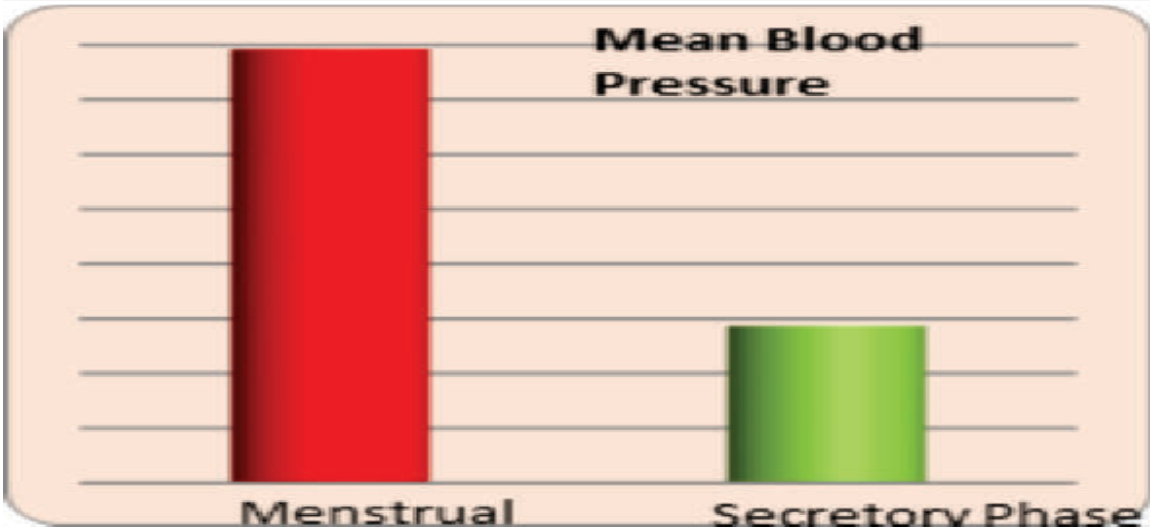

Table : 5
Proliferative Phase Vs Secretory Phase

Parameters	Proliferative Phase (Average)	Secretory Phase (Average)	SD (+/-)	p-value	Remark
Pulse (P)	82.58	78.2	2.37	0.87	NS
Systolic BP (SBP)	104.36	108.5	2.056	0.04	HS
Diastolic BP	72.74	65.9	0.822	0.31	NS
Pulse Pressure	38.62	46.6	1.865	0.01	HS
MAP	88.61	94.43	1.04	0.43	NS

Discussion: The aim of our study to observe the effect of phases of menstrual cycle on blood pressure indices and pulse in healthy females. These parameters are indicators of cardiac autonomic function. In our study there was decrease in systolic BP and MAP during follicular phase as compared to menstrual phase. But there is significant decrease in diastolic BP and MAP during secretory phase as compared to menstrual phase. Though there was no significant difference in pulse rate but significant change in pulse pressure between follicular and secretory phase has been shown in present study. Şadan Yazar didn't find any change in basal HR in proliferative and secretory phase. [10] Maroosha Farooq et al found a significant increase occurred in pulse rate, Systolic BP, Diastolic BP and MAP during the secretory phase as compared to the follicular phase of the menstrual cycle [13]. Tejinder et al studied the effect of heart rate variability during different phases of menstrual cycle and they didn't find any major changes. A difference of the balance of ovarian hormones may be responsible for these changes of autonomic functions during the menstrual cycle [14]. In present study there was no significant difference in both systolic and diastolic blood pressure among phases of the menstrual cycle.[15]

CONCLUSION

The balance of ovarian hormones may be responsible for these changes of autonomic functions during the menstrual cycle .Though there are haemodynamic homeostatic mechanisms in human body but effect of endogenous change in hormonal which are the physiological changes during different phases of menstrual cycle supports the result of study. Physiologically parasympathetic activities marked in the proliferative phase and sympathetic nervous activities predominate the secretory phase .

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