

A Study of Blood Pressure Variation in Different Phases of Menstrual Cycle

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Abstract

Aim: The aim of the study is to assess blood pressure variation in different phases of menstrual cycle

Objectives: To investigate any changes in blood pressure during different phases of menstrual cycle using mercury sphygmomanometer.

Material and Method: 30 apparently healthy female medical students aged between 18-23 years were selected for the study and blood pressure was recorded by auscultatory method using mercury sphygmomanometer during the different phase of menstrual cycle as follows: a) Menstrual phase (MP) (2nd day) b) Proliferative phase (PP) (11th day) c) Secretory phase (SP) (22nd day).

Results: Statistical analysis was done using SPSS 17.0 Software. To compare means of two independent groups, students t- test for independent samples was used. There was no significant difference in both systolic and diastolic blood pressure among different phases of the menstrual cycle

Conclusion: There was no significant difference in both systolic and diastolic blood pressure among different phases of the menstrual cycle. These findings should be re-examined with a larger study group.

Keywords: Blood pressure, menstrual cycle, Menstrual phase, Proliferative phase, secretory phase.

Introduction

The menstrual cycle is a repetitive phenomenon occurring during the reproductive life of a female, that involves a patterned sequence of structural, functional and hormonal changes in the reproductive system. The menstrual cycle is characterized by cyclical fluctuations in the levels of Follicle stimulating hormone (FSH), Luteinizing hormone (LH), oestrogen and progesterone. These hormones are known to have an effect on oxygen carrying capacity, immune response, bleeding and also

changes in serum electrolytes which may be responsible for variable physical, psychological symptoms and autonomic changes.

The characteristic rhythmic changes in the rate of secretion of ovarian hormones produce corresponding changes in reproductive and other organ systems. Variation in Blood Pressure during different phases of menstrual cycle can also be attributed to the effect of ovarian hormones on cardiovascular function.

Data from studies indicate that progesterone, the natural progestin, has either neutral or depressor effects on blood pressure. For example, decreases in blood pressure with the progression of pregnancy are positively correlated with increases in progesterone¹, oestrogen administration was known to promote vasodilator action by increasing prostacyclin and nitric oxide synthesis and the physiologic changes observed during the luteal phase of menstrual cycle are known to mimic early

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pregnancy¹, These include a marked decrease in total peripheral resistance and a significant decrease in mean arterial pressure in the mid luteal phase².

The incidence of coronary artery disease (CAD) and hypertension (HTN) is relatively low among women in reproductive age, with a sharp rise after menopause³. Oestrogen is also known to reduce the development of HTN in pre-menopausal women through peripheral actions such as up-regulation of endothelium derived vasodilator factors with simultaneous downregulation of vasoconstrictor factors. Oestrogen might protect against elevated arterial pressure by inhibiting sympathetic nervous activity⁴.

This study is carried out to find any blood pressure variation in different phases of menstrual cycle.

Materials and Method

The study was carried out at Gandhi medical college, secunderabad 30 apparently healthy female medical students aged between 18-23 years were selected for the study.

Inclusion Criteria:

1. Normal regular menstrual cycles of 27-33 days.
2. Ovulatory cycles

Exclusion Criteria:

1. Subjects below 18yrs and above 23yrs of age.
2. Subjects with endocrinal & gynecological disorders, chronic diseases, allergic conditions.

3. Subjects with Diabetes.
4. Pregnant subjects.
5. Subjects with irregular menstrual cycle.
6. History of drugs intake affecting menstrual cycle.

All the subjects were explained about the BP recording and informed consent was taken

Recording of Blood Pressure:

Subjects were allowed to rest for half an hour in the laboratory before taking them to the examination couch. Blood pressure was recorded by mercury sphygmomanometer and littman stethoscope. Blood pressure was measured by auscultatory method. The equipment was checked and calibrated for its accuracy as per the recommendations by British hypertension society⁵.

Blood Pressure was recorded during the following Phases of Menstrual cycle:

- i. Menstrual phase (MP) (2nd day)
- ii. Proliferative phase (PP) (11th day)
- iii. Secretory phase (SP) (22nd day)

Statistical analysis was done using SPSS 17.0 Software. To compare means of two independent groups, students t- test for independent samples was used.

P value < 0.05 was considered as statistically significant

Observation and Results

Table 1: Comparison of Blood pressure in different phases of menstrual cycle S.B.P, Systolic Blood Pressure; D.B.P, Diastolic Blood Pressure

Parameter	MP (Mean±S.D)	PP (Mean±S.D)	SP (Mean±S.D)	MPVsPP		MPVsSP		PPVsSP	
				T Value	P Value	T Value	P Value	T Value	P Value
S.B.P (mmHg)	108.33±8.34	109.67±10.66	107.47±11.36	0.542	P=0.62	0.334	P=0.83	0.78	P=0.44
D.B.P (mmHg)	63.67±8.9	67.33±9.07	65.33±8.6	1.578	P=0.14	0.735	P=0.74	0.876	P=0.48

There was no significant difference in both systolic and diastolic blood pressure among phases of the menstrual cycle

Discussion

The human menstrual cycle involves physiological and biochemical changes. It is under the control of Hypothalamo-Pituitary-Ovarian (HPO) axis. Steroid hormones, oestrogen and progesterone which play a major role in menstrual cycle are controlled by an integrated HPO axis through release of FSH and LH.

In the present study, Systolic Blood Pressure (S.B.P) & Diastolic Blood Pressure (D.B.P) were increased in Proliferative Phase (PP) compared to other phases but were statistically insignificant. Findings of our study were in accordance with previous studies^{6,7}.

However, Other studies showed that Resting SBP was significantly higher in the ovulatory phase than in other phases, but resting DBP did not differ significantly between phases¹². In another study SBP was lower during the follicular phase while DBP and Heart rate (HR) were lower during the menstrual and follicular phases¹³. In a study carried out by McFetridge and Sherwood, Resting DBP was lower during luteal phase and higher during follicular phase whereas SBP remained uniform across the menstrual cycle¹⁴.

Data on the effects of estrogenic preparations on blood pressure are inconsistent, and include reports of blood pressure lowering⁹, blood pressure elevating¹⁰ and blood pressure neutral effects¹¹.

Unlike the natural oestrogen estradiol, the synthetic oestrogen, ethinyl estradiol increases blood pressure⁸ by an increase in the hepatic synthesis of renin substrate, which leads to an increase in plasma angiotensin-II level and aldosterone mediated salt and fluid retention.

In a study, oral administration of natural progesterone significantly lowered blood pressure in six men and four postmenopausal women with mild to moderate hypertension who were not receiving antihypertensive drugs¹⁵. However with Natural progesterone administration, no change in blood pressure was recorded¹⁶.

The different findings may be attributed to various complex interactions among vasoactive mediators (e.g., nitric oxide, prostaglandins, prostacyclins, and the renin-angiotensin system), hemodynamic changes (i.e., cardiac output and systemic vascular resistance), and sex hormones (i.e., oestrogens and progesterone).

In our study, there was no significant difference in

both systolic and diastolic blood pressure among phases of the menstrual cycle. Simultaneous hormonal assays would offer an advantage to assess Blood pressure changes in different phases of menstrual cycle, if any. And also the present study was carried out on small number of subjects, further studies should be carried out with more number of subjects to substantiate our result.

Conclusion

There was no significant difference in both systolic and diastolic blood pressure among phases of the menstrual cycle. The findings should be re-examined with a larger study group.

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Ethical Clearance: Taken from Scientific Ethical committee, Gandhi Medical College, Secunderabad, Telangana.

Conflict of Interest: Nil

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