Blood Pressure Changes in menstrual cycle

The menstrual cycle is much more than a cycle of periods. Menstruation is only one manifestation of the ovarian cycle which is itself is associated with many physical, psychological and behavioral changes. Numerous clinical disorders also appear to be modulated by cyclic ovarian activity. Certain autonomic changes like blood pressure have also been reported during different phases of menstrual cycle but are not well documented and the results are conflicting. The literature reveals many types of behavioral and other changes in women especially during the premenstrual phase. Hence a study was taken up to know the effect of blood pressure changes during different phases of menstrual cycle. 30 lady medical students aged between 18-20 years of J.S.S. Medical College & Hospital and Dental College & Hospital Mysore were selected for the study. Informed consent was obtained from each subject. The students having regular menstrual cycle lasting 26-34 days and normal range of hematological and biochemical parameters within normal limits and normotensive (< 140/90 mmHg) were taken as inclusive criteria. The subjects with irregular menstrual cycle of 35 days history of diabetes mellitus, hypertension, other endocrine disorders, history of postural symptoms or syncopal attacks and history medication during the study were excluded. Experimentations were performed in the department of Physiology J.S.S.Medical College and Hospital, S.S.Nagar, Mysore in accordance with the ethical standards of the committee on human experimentation of the institution according to Helsinki Declaration of 1975.Subjects were divided into three groups based on the phase of menstrual cycle (Group-I – menstrual phase, Group-II –follicular phase and Group-III –luteal phase). Subjects were monitored for Resting blood pressure, Supine to standing BP, blood pressure changes during Isometric Handgrip dynamometer test and cold pressor test. It was observed that in all the tests performed, systolic blood pressure difference between menstrual and follicular phase and follicular and luteal phase was statistically significant ($P<0.05$) (Table 1). Diastolic blood pressure was not significant ($P>0.05$) in all the tests except for handgrip dynamometer.

The results were consistent with each of the earlier studies of Hassan, Mehta and Greenberg which showed an increase in systolic blood pressure during the luteal phase. They explained the increased fluid and salt retention induced by ovarian steroids as the basis for the above changes. Estrogen can cause both a rise in blood pressure and cardiovascular damage unrelated to hypertension. The most important estrogen effect is an increase in the hepatic synthesis of renin substrate, which leads to an increase in plasma angiotensin-II level and aldosterone mediated fluid retention. In addition, arterial walls have estrogen receptors that may modulate smooth muscle tone and estrogen increases the vascular sensitivity to catecholamines. Higher sympathetic activity was observed due to increased levels of estrogen and progesterone in the luteal phase. Also the use of exogenous progesterone is known to increase arterial blood pressure. Thus it is possible that elevated progesterone may be responsible for the increase in systolic blood pressure in luteal phase of the menstrual cycle. Physiological and psychological stress contributes to the blood pressure rise at premenstrual and menstrual phase. Fundamentally the mechanism of higher systolic pressure in the luteal phase still is largely unknown.From the present study, it may be concluded that there was significant difference in systolic blood pressure during different phases of menstrual cycle in young healthy volunteers. Inspite of the limitations in being noninvasive technique, the present study provides data that should be clinically useful to the gynecologists in making a diagnosis of hypertension, orthostatic changes in blood pressure.

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