Awareness of blood pressure changes during menstrual cycle

Abstract

Introduction Blood pressure is not constant at different days of the month and even throughout the day.Variation in BP during different phases in the menstrual cycle can also be attributed to the effect of the female hormones on cardiovascular systems. The purpose of the study was to evaluate the awareness of blood pressure changes during the menstrual cycle

Aim To Assess the Awareness of Blood Pressure Changes During Menstrual Cycle

Materials and Methods The sample size used for the study is 100. A self structured questionnaire was prepared and uploaded on google forms. This standard questionnaire in google forms was circulated. After which all the data was collected and the data was analysed using Chi square analysis. The Chi square analysis was done using SPSS software.

Result We were able to establish a fair awareness about blood pressure changes during the menstrual cycle among our study population. It was statistically significant with p value of 0.037 ($P<0.05$).

Discussion Variation in BP during different phases of the menstrual cycle can also be attributed to the effect of ovarian hormones on cardiovascular function. Since hormonal changes follow a non-linear trend throughout the menstrual cycle, it may have an unpredictable effect on BP regulation

Conclusion There is a fair amount of awareness about blood pressure changes during menstruation among both women and men but women have more awareness.

Key words: blood pressure, menstrual cycle, systolic, diastolic

Comment [RT1]: Consider formatting

Comment [RT2]: Abbreviation is not disclosed earlier

Comment [RT3]: Rewrite methods to include more information about participants. Last two sentences can be clubbed to get more space.

Comment [RT4]: Check Grammar. It should be not be in present tense

Comment [RT5]: Repeated text

Comment [RT6]: Please follow the authors guidelines with regard to reporting of *P* value..

Comment [RT7]: Combine results and discussion in one section. Give more data in results, just giving p value is not enough for the readers to understand results

Comment [RT8]:

Comment [RT9]: My suggestion not include keywords from title

Introduction

Blood pressure plays an important role during the women's menstrual cycle and studies conducted till date haven't given affirmative results (1). Clinical sign is claimed positively to threshold and tolerance during follicular phase and ovulatory phase (1,2). Progesterone only pills aren't only used conventionally as oral contraceptives they also provide relief from menstrual pain (3). These pills are currently being prescribed at a high rate(4). Women that take external origin progesterone have repercussions associated with the pills like cardiovascular diseases and an increase in vital signs (5). There is a little acute rise in systolic and diastolic sign around the onset of menstruation (6) at the time of follicular phase oestradiol concentration is high(7). However during the luteal phase when both oestradiol and progesterone level is high there is an increase in blood pressure.(8) The above information tells us the impact of female sex hormones on pheripheral blood flow and vascular tone (6,9)

Comment [RT10]: Formatting?

Menstruation alongside periodic bleeding from the blood vessels at the time of the uterine mucosa shedding features a direct reference to the ECG and vital sign changes during different phases of a women's cycle (10) (11)Variations in vital sign at different phases of cycle is caused by many reasons one among them being the effect of ovarian hormone on cardiovascular function,(12) however the hormonal changes follow a nonlinear pattern throughout the cycle it's hit or miss or non standard effect on the women's blood pressure (6,9,13). Heart rate variations analysis has been extensively done to examine the mechanism involved in autonomic control of the guts(14) . HRV analysis can assess the general cardiac health and therefore balance sympathetic and parasympathetic regulation on cardiac activity. (15).

Gonadotropic hormones are known to affect this balance(16). Guastic et al, sato et al, and et al suggested an enhanced sympathetic activity within the luteal compared to the follicular phase of a woman's cycle (17)the above mentioned points bring us to the conclusion that there are certain affirmative changes within the pulse variation during different phases of the cycle (6,9,13,18). If vital signs change cyclically it can warrant a rise or decrease within the dose of the antihypertensive medication in hypertensive women of reproductive age bracket (19). Estrogen has beneficial effects on (cardiovascular system) by decreasing LDL cholesterol and increasing HDL cholesterol protest on blood vessels causing vasodilation through an endothelial nitric oxide synthase (20) Menstruation is merely one manifestation of the ovarian cycle which is itself related to quite 200 physical and psychological and behavioural changes(21). The cycle is an integral part of a serious portion of a woman's life ovarian hormones major portion of a woman's life (10,13) ovarian hormones alteration along the cycle are related to corresponding significant changes in multiple neurohormonal homeostatic mechanisms regulating the circulatory system . (22) Gonadal hormones influence the circulatory system both directly and indirectly(23). Ventricular arrhythmias are more common in women and appear to be related to cycle and also exhibit variations in reference to the cycle . (23,24)variety of research articles have thrown light o the influence of cycle on heart and respiration (13) A study examining vital sign and pulse responses to a mental arithmetic task during a sample of 16 regularly menstruating women during the follicular and secretory phase of their cycle the findings said that hormonal variations

characteristic of the luteal and follicular phases don't assert an influence on common and assessment of cardiovascular stress reactivity (15). Gonadal hormones not only influence the reproductive function but also oestrogen and progesterone a marked effect on the circulatory system some behavioural and neurological symptoms like headache, painful enlargement of breast, weight gain, increased vital sign, decreased concentration, nervous irritability emotional instability poor judgement depression tension are seen in women during premenstrual phase (22). The aim of the study is to spread awareness about blood pressure during the menstrual cycle.

Comment [RT11]: Grammar?

Comment [RT12]: What is the significance of this study?
Is this study fill any gap in existing knowledge?
What forms the basis for this study? Why did you choose this study? This information should be given in a coherent manner to build your background and rationale for the study. Just merely writing the review is not all that constitute introduction part.

Materials and methods

A cross-sectional survey was conducted among the adolescent population with a sample size of 100. A self administered structured questionnaire was prepared based on visual pollution and consisted of 15 questions. It was circulated to participants through an online platform (google form). The statistics were done using SPSS software, chi-square test was used to check the association and p value of 0.05 was said to be statistically significant.The pros of the survey is that the adolescents of different lifestyles and cultures were surveyed . Children and adults were excluded from the survey. Simple random sampling method was the sampling method used to minimise the sampling bias. All those who were willing to participate in the survey were included in the study. Those who were not willing and those that had language barriers in answering the english version of the questionnaire were excluded from the study.

Comment [RT13]: Please elaborate your methods. Add more information about participants characteristics. What is age range, gender, ethnicity and any other relevant information about participants?
What is sampling procedure? How did you select sample? Is there any inclusion or exclusion criteria?
Did you take written informed consent from the participants?
Where is the ethical approval for the study?
Is this study conforms to Helsinki declaration?
Ethical approval code?

Please elaborate the questionnaire used in the study?
Which questionnaire was used? What is the reference to the questionnaire?
Reliability and validity of questionnaire?
How did you administer the questionnaire? Give more details.

Please recheck grammar used in the manuscript, specially the tense, please have consistency in the tensed used in he manuscript.

Results

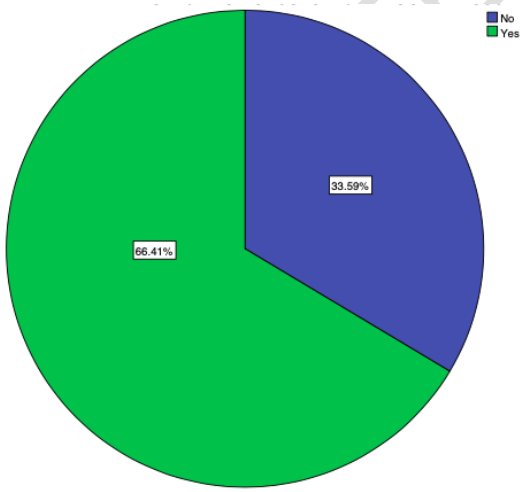

Figure 1 Piechart showing percentage distribution on the awareness about blood pressure changes during menstruation. Whereas 66.4 % (green) of the participants are aware about the blood pressure changes and 33.59 % (blue) of the participants are not aware about the blood pressure changes during the menstrual cycle.

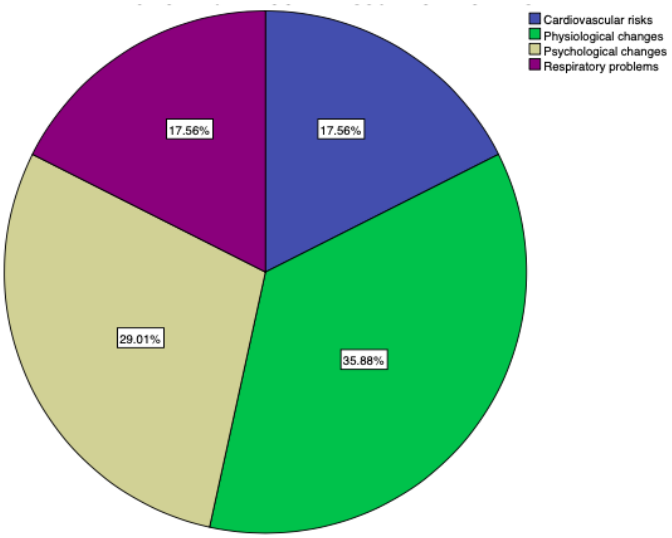

Figure 2 Pie chart showing the percentage distribution about the risk factors during the menstrual cycle. In which 17.56 % (blue) of the participants responded that there will be high risk of cardiovascular system, 35.88 % (green) of the participants said that there will be severe physiological changes, 29.01 % (beige) of the participants said that they will be having psychological changes and 17.56 % (purple) of the participants responded for respiratory problems.

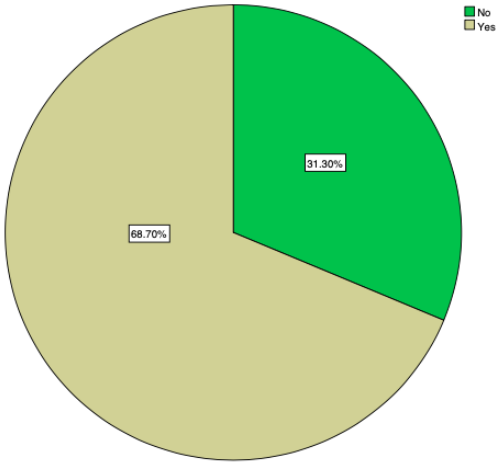

Figure 3 Pie chart showing the percentage distribution about the effect of blood pressure changes during menstrual cycle. In which 31.30 % (green) of the participants doesn't know the effect of blood pressure during the menstrual cycle and 66.70 % (beige) of the participants knows the effect of blood pressure during menstrual cycle.

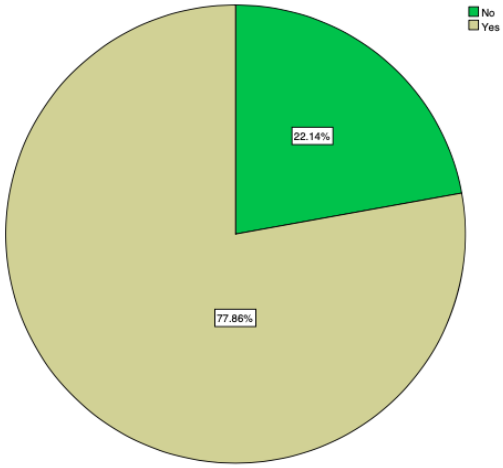

Figure 4 Pie chart showing the percentage distribution about the awareness of decrease in blood pressure during menstrual cycle. In which 22.41 % (green) of the participants are not aware about the drop of blood pressure during the menstrual cycle and 77.86 % (beige) of the participants are aware that the blood pressure will decrease during the menstrual cycle.

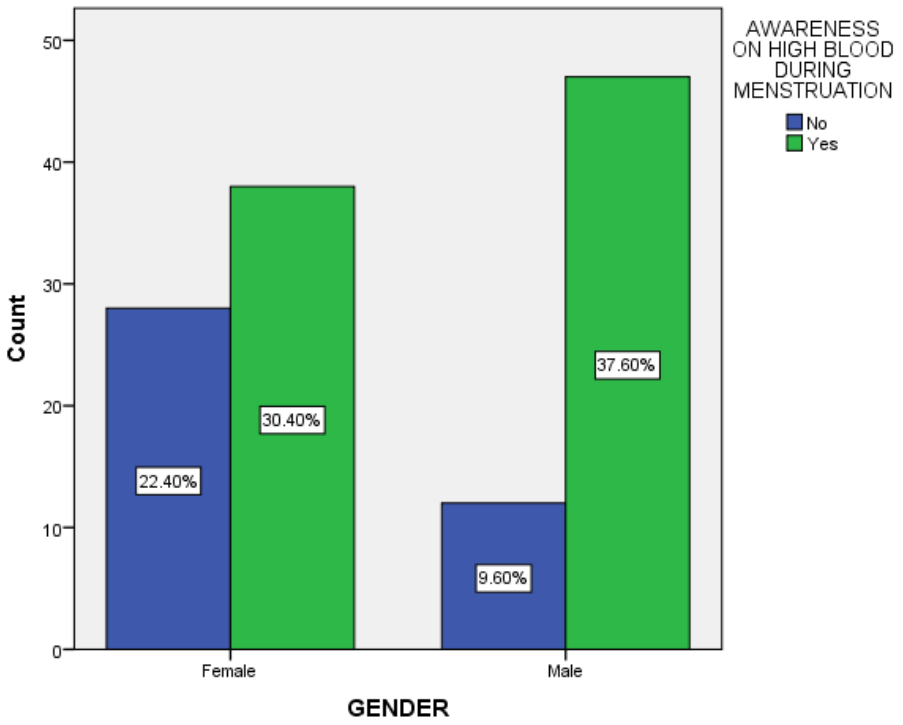

Figure 5: Bar graph represents the association between Gender and the Awareness of high blood pressure during menstrual cycle. X axis represents the Gender and the Y axis represents the number of participants. Among females 30.40 % (green) are aware about the increase in blood pressure during the menstrual cycle whereas 22.40 % (blue) of the participants are not aware. Among Males, 37.60 % (green) are aware and 9.60 % (blue) of the participants are not aware about the increase in blood pressure during the menstrual cycle. Chi square test was used for statistical significance. Chi square value was found to be 0.004 ($p<0.05$). Hence proving the statistical significance, provided Males are more aware about the increase in BP during menstruation.

Comment [RT14]: I could not see any male participants in your method section. Do you have male participants also?

DISCUSSION

66.4 % (green) of the participants are aware about the blood pressure changes (figure 1), 35.88 % (green) of the participants said that there will be severe physiological changes (figure 2), 66.70 % (beige) of the participants knows the effect of blood pressure during menstrual cycle (figure 3), 77.86 % (beige) of the participants are aware that the blood pressure will decrease during the menstrual cycle (figure 4), Among Males, 37.60 % (green) are aware of the increase in blood pressure during the menstrual cycle (figure 5).

Previous literature have explained the influence of endogenous cyclic changes in female sex hormones during menstrual cycle. (25,26). Influence of daily life activity on pulse rate and blood pressure changes during menstrual cycle.(27,28) Another such study demonstrates that the female hormone status does not affect the BP response to sodium in young normotensive women.

However, in contrast with systemic haemodynamics, the renal response to salt varies during the normal menstrual cycle,(29) suggesting that female sex hormones play a vital role in the regulation of renal heamodynamics (30) there are gender associated differences in blood pressure in humans, with men having high BP than age matched pre menopausal women and being at greater risk for cardiovascular and renal diseases (31)). In another study women had significantly greater a1-adrenergic vasoconstriction during the luteal phase than during the follicular phase.(32) This effect cannot be attributed to changes in plasma norepinephrine levels, which did not vary across the menstrual cycle,(33) or to elevations in blood pressure, because diastolic blood pressure was actually lower in the luteal phase(34) This finding supported the hypothesis that endogenous progestogen might have a hypertensive effect, as does exogenous progestogen(35). However, a second study designed to confirm this finding failed to do so, showing no cyclical change in the level of blood pressure (36)The sample size of the study was small and limited to the people of Tamil Nadu. In future studies a larger sample size including wider regions of India can be done. (37)

Conclusion

Changes in blood pressure during the normal menstrual cycle are not well documented and previous studies have given conflicting results, however there is fine awareness about these blood pressure changes in dental students. Among dental students females have greater knowledge about blood pressure changes during menstrual cycle in comparison to males. The dental students belonging to the study population believe psychological, physiological, cardiovascular and respiratory changes influence the sympathovagal balance in normally menstruating females. Further studies should be done in a larger sample size to establish the results and to improve the clinical interpretation which may further improve the quality of life

Comment [RT15]: You should not start the paragraph with number.

Comment [RT16]: This is just repetition of results here. Please rewrite in a better way.

Comment [RT17]: What is BP? Please elaborate it first in earlier text?

Comment [RT18]: This not how the discussion is written. You have just quoted previous studies here. Please interpret your findings in relation to these studies. What is your opinion on the findings? Proper analysis of findings is required.
In first paragraph you have mentioned the findings and in second paragraph you mentioned previous studies. This is not called discussion. Please rewrite with more impact and meaning.

Comment [RT19]: I am surprised to see your conclusion. conclusion are not in line with your methods, participants and your findings.
You have concluded that female dental students have greater knowledge.
My question is from these dental students appear?
In method, you mention, that you have selected 100 adolescent students. There is no mention about Dental students? I did not see dental student in your results also.
This is very carelessly written.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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