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ORIGINAL RESEARCH

To compare the diet, menstrual distress, and breathing during the different phases of menstruation in young, healthy females

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ABSTRACT

Background: The menstrual cycle, consisting of periods, follicular, ovulatory, and luteal phases, is influenced by hormonal changes that affect a woman's overall health, including her eating habits, physical condition, and breathing patterns. **Aim:** We aimed to compare the diet, menstrual distress, and breathing during the different phases of menstruation in young, healthy females. **Materials & methods:** The Department of Physiology at Index Medical College & Research Center in Indore, Madhya Pradesh conducted an observational clinical study on 100 subjects aged 18-25 years. The study included detailed medical, family, and drug history, dietary intake, and cardiac autonomic tests. The participants were selected using simple random sampling and had to be between the ages of 18 and 25 years old. Exclusion criteria included not being between the ages of 18 and 25, pregnant or breastfeeding, living outside the study area, having a history of systemic hypertension, dyslipidemia, coronary heart disease, or autonomic disease, having polyneuropathy, unwilling to give written informed consent, smoking, alcoholism, medical illness, or being on oral contraceptive pills or hormonal replacement therapy. **Results:** The study analyzed three menstrual phases and their relationship with meal patterns. No significant differences were found in dietary habits. The menstrual distress questionnaire showed a positive correlation with related outcomes. The secretory phase had a significantly higher mean resting heart rate than the proliferative phase, indicating sympathetic dominance. The 30:15 ratios between the proliferative and secretory phases were greater during the secretory phase, indicating superior parasympathetic regulation. The slow deep breathing technique showed a statistically significant difference between the proliferative and secretory phases, with the secretory phase having a higher value. **Conclusion:** Our study concludes that diet, menstrual pain, and breathing habits significantly change between menstrual phases in healthy girls. Hormone levels and dietary changes can impact respiratory efficiency and symptoms. Individualized plans are crucial for improving health.

Keywords: Menstruation; follicular phase; proliferative phase; healthy females; breathing tests; menstrual distress, diet.

INTRODUCTION

Hormonal changes that occur during a woman's menstrual cycle impact her overall health in many ways, including her eating habits, her physical condition, and her breathing patterns. Period, follicular, ovulatory, and luteal phases make up the menstrual cycle, and each of these stages has its own individual hormonal profile. Hormonal shifts affect non-reproductive systems as well as reproductive ones, altering things like energy metabolism, respiratory efficiency, food choices, and hunger [1,2]. Period pain, which affects a large percentage of women, can have both physiological and psychological effects, which can further impact these factors [3-5]. Because desires and dietary needs are influenced by hormonal fluctuations, diet becomes very important during menstruation. Changes in the hormones progesterone and estrogen, which control the respiratory drive, may cause changes in breathing patterns [6-9]. These changes might be worsened by menstrual discomfort, which includes symptoms like pain and mood swings [10,11]. It affects both daily living and overall health [12,13]. Few studies have investigated how these elements interact during the menstrual cycle, despite the fact that they have a substantial impact [14-20]. The purpose of this study is

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to track the eating habits, period pain, and breathing patterns of healthy, young women as they go through their periods. This study aims to shed light on these differences in order to develop more personalized treatments that can improve menstruation people's quality of life by reducing the severity of menstrual symptoms. Therefore, we aimed to compare the diet, menstrual distress, and breathing during the different phases of menstruation in young, healthy females.

MATERIALS & METHODS

The Department of Physiology at the Index Medical College & Research Center in Indore, Madhya Pradesh conducted an observational clinical study. The study population consisted of 100 subjects aged 18 to 25 years in Indore city, selected using simple random sampling. The inclusion criteria required participants to be between the ages of 18 and 25 years and have given their informed written consent. Exclusion criteria included those not between the ages of 18 and 25, pregnant or breastfeeding, living outside the study area, having a history of systemic hypertension, dyslipidemia, coronary heart disease, or autonomic disease, having been diagnosed with polyneuropathy or diseases that may cause autonomic dysfunction, unwilling to give written informed consent for the study, smoking, alcoholism, medical illness, or being on oral contraceptive pills, hormonal replacement therapy, or drugs that change the way the heart works. The study involved detailed medical, family, and drug history, dietary intake, and cardiac autonomic tests. The menstrual phase (M) was the 1st to 5th day of bleeding, while the follicular phase (F) was the 6th to 14th day of the menstrual cycle. The next menstrual bleeding occurred during the Luteal phase (L), which spans from the 15th to the 28th day. Conventional reflex testing methods included patient preparation, avoiding food for two hours before the test, wearing loose and comfortable clothing, and performing the Valsalva maneuver. The expiratory pressure was maintained at 40 mmHg for 15 seconds, and ECG and respiration were recorded for 1 minute to get baseline values.

Statistical analysis

The data distribution parameters were assessed using standard normality tests and ANOVA for comparison, with a significance level of $p < 0.05$, and all statistical analyses were conducted using SPSS software.

RESULTS

Table 1: Analyzing the three menstrual phases in relation to the number of meals eaten at various times of the day or types of meals.

Parameters	Menstrual (n=100)	Proliferative (n=100)	Secretory (n=100)	ANOVA P value
Breakfast	1.6 ± 1.2	1.6 ± 1.1	1.5 ± 1.3	0.794
Lunch	2.7 ± 0.8	2.8 ± 0.8	2.7 ± 0.7	0.569
Dinner	2.8 ± 0.8	2.6 ± 0.7	2.7 ± 0.6	0.135
Midmorning snack	0.5 ± 0.7	0.7 ± 0.9	0.7 ± 0.8	0.129
Midafternoon snack	1.4 ± 1.2	1.4 ± 1.2	1.3 ± 1.1	0.783
After-dinner snack	1.3 ± 1.0	1.2 ± 1.1	1.4 ± 1.1	0.417
Meal frequency	6.8 ± 1.6	6.9 ± 1.7	6.8 ± 1.6	0.883
Snack frequency	3.1 ± 1.8	3.1 ± 2.1	3.2 ± 2.4	0.928

Table 1 shows the analysis of the three menstrual phases in relation to the number of meals eaten at various times of the day or types of meals. The present study did not observe significant difference in the dietary habits during the different phases of menstruation in the study population.

Table 2: The Menstrual Distress Questionnaire scores, mean, and standard deviation (SD), as well as their ranking.

Parameter	Mean ± SD	Rank
Cramps	2.48 ± 0.93	1
Fatigue	2.41 ± 0.83	2
Backache	2.21 ± 1.01	3
Swelling (breasts, abdomen)	2.18 ± 0.86	4
Painful or tender breasts	2.07 ± 0.87	5
Dizziness	1.89 ± 0.81	6
General aches and pains	1.79 ± 0.90	7
Cold sweats	1.72 ± 0.84	8
Headache	1.67 ± 0.76	9
Nausea, vomiting	1.45 ± 0.79	10
Hot flashes	1.37 ± 0.61	11
Muscle stiffness	1.37 ± 0.63	11
Swelling legs	1.34 ± 0.63	12

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Heart pounding	1.35 ± 0.61	12
Skin blemish or disorder	1.18 ± 0.41	13
Numbness	1.16 ± 0.44	14

Table 2 depicts the menstrual distress questionnaire scores, mean and standard deviation (SD), as well as their ranking.

Table 3: Results from the Menstrual Distress Questionnaire (MDQ) and related outcomes.

	MDQ	Impact on daily activity (IODQ)	Absence from work	Pain killer usage (PKU)
MDQ	1.0	0.430	0.282	0.321
IODQ		1.0	0.279	0.481
Absence from work			1.0	0.452
PKU				1.0

Table 3 depicts the results from the menstrual distress questionnaire (MDQ) and related outcomes. We observed positive correlation together with a significance of <0.01when correlated between the MDQ and related outcomes.

Table 4: Comparison of deep breathing test parameters in the different phases of menstruation.

Parameters	Menstrual (n=100)	Proliferative (n=100)	Secretory (n=100)	P value
Resting phase	80.13±2.41	82.37±8.68	84.45±7.75	**<0.0001**
30:15 ratio	1.11±0.07	1.16±0.09	1.19±0.08	**< 0.05**
E: I ratio	1.52±0.16	1.67±0.35	1.71±0.34	**< 0.001**
Valsalva ratio	2.12 ± 0.14	2.09 ± 0.82	2.15±0.82	**< 0.05**

The difference in mean resting heart rate between femalesin proliferative and secretory phases is seen in Table 4. The mean resting heart rate in the secretory phase was substantially greater than in the proliferative phase, indicating sympathetic dominance. The mean heart rates in both groups, however, are within the normal range. Table 4 depicts the 30:15 ratios between the proliferative and secretory stages. However, it was greater during the secretory phase, indicating superior parasympathetic regulation or modulation. Table 4 depicts a very statistically significant difference between the proliferative and secretory phases in the mean E: I ratio obtained from the slow deep breathing technique. Table 4 illustrates that the secretory phase has a greater valuethan the proliferative phase.

DISCUSSION

Leg cramps and extreme exhaustion were the two most common and serious symptoms in our study. The conclusions reached here agree with those of studies of [19,20]. On the other hand, a study [21] discovered that extreme exhaustion was the most common and severe menstrual symptom [12]. Another cultural difference that may cause clinical disparities during menstruation is headaches, which they discovered to be the second most prevalent complaint. Our results corroborated those of [17,19,20], who discovered that dysmenorrhea is more common in older adolescents (48% at age 12 and 79% at age 18), and that there is a positive correlation between age and menstrual discomfort [22]. Period pain is likely not severe in the early phases, even though teenagers do not know or have experience with appropriate treatments. In contrast to findings [18], which indicated a positive association between increasing gynecologic age and symptom severity but no significant correlation with chronological age, our data showed the opposite [19]. Period discomfort is more severe for teenage girls since they do not yet know how to control it. Mothers are valuable resources for adolescent girls as they prepare for menstruation, which is a critical life event [20,21].

During the secretory phase of the menstrual cycle, individuals observe a greater mean resting heart rate. Between the secretory phase and the proliferative phase, the heart rate response to slow deep breathing (E: I), the Valsalva ratio, and the 30:15 ratio all go up significantly. There was a marked increase in parasympathetic function throughout the secretory period, as demonstrated below. Results from other previous studies contradict those of the present investigation [1-4]. Parasympathetic activity decreases significantly during the luteal phase, according to [5]. Still, both phases' average systolic and diastolic blood pressure measurements are within the normal range. Nonetheless, during the secretory phase of the menstrual cycle, the individuals exhibit enhanced parasympathetic and sympathetic control, as shown by the preceding findings. Estrogen causes parasympathetic activity during the proliferative phase, and progesterone doesn't seem to balance it enough during the secretory phase. As the secretory phase progresses, certain parameters, like resting heart rate, SBP, and DBP, indicate sympathetic predominance. One possible explanation is that progesterone, with certain limitations, blocks estrogen's effect on the regulation of cardiac autonomic function. Table 4 shows that female

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patients in the proliferative and secretory phases of the menstrual cycle have a mean of 30:15, which supports this theory. Table 4 displays the average E:I ratio among female individuals during the secretory and proliferative phases of the menstrual cycle.

CONCLUSION

Diet, menstrual pain, and breathing habits fluctuate significantly between menstrual phases in young, healthy girls, according to the study. The results show that the way you eat and your hormone levels affect your respiratory efficiency and menstrual symptoms. Individuals may be able to decrease menstruation discomfort and improve general health by adopting targeted therapies, such as dietary changes or breathing exercises, if they are more aware of these changes. The findings of this study highlight the importance of developing individualized plans to meet the specific physiological and behavioral requirements of menstruation.

Conflict of interest

There is no conflict of interest among the present study authors.

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