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COMBINED INFLUENCE OF BODY MASS INDEX, PERCEIVED STRESS AND AGE AT MENARCHE ON MENSTRUAL PHYSIOLOGY IN FEMALE MEDICAL STUDENTS

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Relevance. Menstrual health is an important indicator of female reproductive function and reflects the integrity of the hypothalamic-pituitary-ovarian (HPO) axis. In young female medical students, factors such as body mass index (BMI) and perceived academic stress, along with age at menarche, may affect reproductive health. Variations in these factors can lead to dysmenorrhea and premenstrual symptoms. Therefore, studying them helps in recognizing the early signs of reproductive imbalance through cycle regularity and length.

Aim: this study evaluated the association of BMI, perceived stress, and menarcheal age with premenstrual symptom severity, dysmenorrhea intensity, and menstrual cycle patterns among female medical students.

Materials and methods. A cross-sectional study was conducted with 40 female medical students who completed a structured questionnaire. Participants who smoked, consumed alcohol, used hormonal contraceptives, had endocrine disorders, gynecological conditions, or chronic diseases were excluded. We categorized age at menarche as early (< 11 years), normal (11-14 years), and late (> 14 years). BMI was calculated based on self-reported height and weight. The standard perceived stress score was evaluated using several questions, assessing stress levels on a scale of 0–3. Premenstrual symptoms were measured using a symptom-based score on a 0–10 scale. Menstrual cycle characteristics were evaluated based on the data collected on cycle length and regularity. The mean and standard deviation were calculated for continuous variables. Pearson's correlation, one-way analysis of variance (ANOVA), and chi-square tests were used to assess relationships and group differences. Statistical significance was set at $p < 0.05$. The null hypothesis (H_0) assumed no association between the studied variables.

Results and discussion. The calculated mean BMI of the participants was 22.31 ± 3.57 kg/m², mean perceived stress score was 2.00 ± 0.91, mean PMS score was 2.00 ± 0.89, and mean dysmenorrhea score was 6.03 ± 2.57. Most participants had a normal age at menarche (77.5%), while fewer had late (10%) and early menarche (12.5%). Pearson's correlation analysis showed positive correlations between stress, PMS scores, and dysmenorrhea. ANOVA showed certain differences in PMS and dysmenorrhea scores among the BMI categories and menarche age groups. The p-value calculated from the chi-square analysis test was $p=0.039$, which shows a significant relationship between BMI and irregularity in menstrual cycles. Students with higher stress levels, abnormal BMI, and those with early and late menarche were associated with higher severity of premenstrual symptoms and dysmenorrhea and showed a tendency towards more menstrual irregularities. These observations show that both physiological and psychological factors affect menstrual health. Perceived stress influences the HPO axis, and the age of menarche reflects differences in early or late hormonal development. Together, these factors contribute to disturbances in menstrual health and may lead to Premenstrual syndrome and Primary Dysmenorrhea.

Conclusions. The null hypothesis was rejected, confirming the association between the studied variables and menstrual health. This research shows that abnormal body mass index, early or late menarcheal age, increased stress, and other lifestyle factors disturb the HPO axis and alter the estrogen and progesterone balance. These hormonal changes increase fluctuations in the menstrual cycle, leading to severe premenstrual symptoms. At the same time increased prostaglandin production causes stronger uterine contractions, resulting in intense dysmenorrhea. These results show that psychological and physiological factors affect female menstrual health.