

INTISARI

Latar Belakang: Mahasiswa kedokteran merupakan populasi yang rentan mengalami stres oleh karena beban akademik yang tinggi. Respons fisiologis terhadap stres dimediasi oleh sistem saraf otonom (ANS, dicerminkan oleh perubahan parameter *Heart Rate Variability*/HRV) dan sumbu hipotalamus-pituitari-adrenal (HPA, dicerminkan oleh perubahan kadar kortisol), serta dapat dipengaruhi tingkat aktivitas fisik, stres emosional, dan kualitas tidur. Mayoritas penelitian sebelumnya menggunakan induksi stres dalam *setting* laboratorium dan jarang menilai interaksi antar faktor gaya hidup dalam modulasi respons stres.

Tujuan: Penelitian ini bertujuan untuk mengevaluasi respons stres akut mahasiswa kedokteran terhadap stresor akademik nyata, serta menilai peran dan interaksi ketiga faktor gaya hidup dalam memodulasi respons stres. **Metode:** Penelitian ini menggunakan desain kuasi-eksperimental dengan *repeated measures* pada 47 mahasiswa kedokteran tingkat akhir. Parameter yang diukur meliputi *Heart Rate* (HR), *Root Mean Square of Successive Differences* (RMSSD), *Low Frequency to High Frequency Ratio* (LF/HF), dan kadar kortisol saliva, pada tiga fase: sebelum, selama, dan setelah paparan stresor. Data dianalisis menggunakan *Linear Mixed Models*. **Hasil:** Paparan stresor akademik nyata memicu peningkatan HR dan LF/HF serta penurunan RMSSD, yang pulih setelah stresor berakhir. Tidak ditemukan peningkatan kortisol yang signifikan selama paparan stresor. Subjek dengan tingkat aktivitas fisik tinggi, stres emosional rendah, dan kualitas tidur baik, cenderung menunjukkan perubahan HR, RMSSD, LF/HF, dan kortisol saliva yang lebih adaptif walaupun perbedaan antar kategori tidak signifikan secara statistik. Tingkat stres emosional dan kualitas tidur memiliki peran signifikan terhadap HRV. Terdapat interaksi signifikan antara tingkat stres emosional dan kualitas tidur terhadap HR dan RMSSD, menunjukkan bahwa efek keduanya bersifat sinergis dalam memodulasi respons stres akut. **Kesimpulan:** Respons ANS terhadap stresor akademik lebih konsisten dibandingkan respons HPA. Stres emosional dan kualitas tidur berperan dominan dan berinteraksi secara sinergis dalam modulasi respons stres akut. Intervensi yang menargetkan kedua faktor ini penting untuk meningkatkan resiliensi mahasiswa kedokteran terhadap stres.

Kata kunci : respons stres, HRV, kortisol saliva, stres emosional, kualitas tidur

ABSTRACT

Background: Medical students are highly vulnerable to stress due to heavy academic demands. Physiological responses to stress are mediated by autonomic nervous system (ANS, reflected by changes in heart rate variability [HRV]) and hypothalamic-pituitary-adrenal (HPA) axis (reflected by salivary cortisol levels). These responses may be influenced by physical activity level, perceived emotional stress, and sleep quality. Majority of studies used laboratory-induced stressors and have rarely evaluated the interaction among lifestyle factors in modulating stress responses. **Objectives:** This study aimed to assess the acute stress response of medical students to a real academic stressor and to examine the role and interaction of the three lifestyle factors in modulating the stress response. **Methods:** This quasi-experimental, repeated-measure study involved 47 final-year medical students. Physiological parameters measured comprised of Heart Rate (HR), Root Mean Square of Successive Differences (RMSSD), Low Frequency to High Frequency Ratio (LF/HF), and salivary cortisol levels across three phases: before, during, and after exposure to an academic stressor. Data were analyzed using Linear Mixed Models. **Results:** Exposure to a real academic stressor triggered an increase in HR and LF/HF and a decrease in RMSSD, followed by recovery after the stressor ended. No significant increase in salivary cortisol was observed during stress exposure. Participants with higher physical activity, lower emotional stress, and better sleep quality showed more adaptive changes in HR, RMSSD, LF/HF, and cortisol levels, although not statistically significant. Emotional stress and sleep quality showed significant effects on HRV. A significant interaction was found between emotional stress and sleep quality on HR and RMSSD, indicating a synergistic effect in modulating acute stress responses. **Conclusion:** ANS-mediated response to academic stressor was more consistent than HPA. Emotional stress and sleep quality were dominant factors and interact synergistically in modulating acute stress response. Interventions targeting these factors are essential to improve medical students' resilience to stress.

Keywords : stress response, HRV, salivary cortisol, emotional stress, sleep quality.