Evaluasi Pengaruh Kantuk terhadap Situation Awareness dan Heart Rate Variability pada Pengemudi Mobil = Evaluation of the Effect of Sleepiness on Situation Awareness and Heart Rate Variability in Car Drivers

Adisti Shafira, author

Abstrak

Durasi tidur yang tidak memadai dapat berdampak negatif pada kemampuan kognitif dan kondisi fisiologis pengemudi, sehingga meningkatkan risiko kecelakaan. Penelitian ini bertujuan untuk menganalisis pengaruh durasi tidur terhadap situation awareness dan heart rate variability (HRV) pada pengemudi. Penelitian dilakukan dalam dua kondisi tidur, yaitu tidur normal (7 jam) dan kurang tidur (4 jam), dengan melibatkan 20 partisipan berusia 18–25 tahun. HRV diukur menggunakan perangkat Polar H10 sebelum dan sesudah aktivitas mengemudi, sementara situation awareness dievaluasi melalui Situation Present Assessment Method (SPAM), dan tingkat kantuk dinilai menggunakan Karolinska Sleepiness Scale (KSS). Data dianalisis menggunakan uji parametrik dan non-parametrik berdasarkan hasil uji normalitas. Hasil penelitian menunjukkan bahwa kurang tidur secara signifikan menurunkan nilai HRV seperti SDNN, RMSSD, dan Mean RR, serta meningkatkan Mean HR dan rasio LF/HF, yang mencerminkan peningkatan beban fisiologis dan dominasi simpatis. Skor SPAM juga lebih rendah dan skor KSS lebih tinggi pada kondisi kurang tidur, yang menandakan penurunan kewaspadaan situasional dan peningkatan rasa kantuk. Selain itu, korelasi antara HRV dengan SPAM dan KSS menunjukkan adanya hubungan signifikan antara kondisi fisiologis dan performa kognitif pengemudi. Temuan ini menekankan pentingnya tidur yang cukup sebelum mengemudi guna menjaga kondisi fisiologis dan kognitif.

.....Inadequate sleep duration can negatively affect drivers’ cognitive performance and physiological condition, thereby increasing the risk of accidents. This research investigates how variations in sleep duration influence drivers’ ability to maintain situation awareness and regulate heart rate variability (HRV) in drivers. The research was conducted under two sleep conditions: normal sleep (7 hours) and sleep deprivation (4 hours), involving 20 participants aged 18–25 years. HRV was measured using the Polar H10 device before and after driving activities, while drivers’ awareness of their surroundings during the driving task was evaluated using the Situation Present Assessment Method (SPAM), and subjective drowsiness levels were evaluated through the Karolinska Sleepiness Scale (KSS). The collected data were processed using both parametric and non-parametric statistical methods, selected according to the outcomes of normality tests. The analysis revealed that sleep deprivation significantly reduced HRV parameters such as SDNN, RMSSD, and Mean RR, and increased Mean HR and LF/HF ratio, indicating higher physiological stress and sympathetic dominance. SPAM scores were also lower and KSS scores were higher under sleep-deprived conditions, reflecting reduced situation awareness and increased drowsiness. Moreover, correlations between HRV, SPAM, and KSS revealed significant relationships between physiological conditions and drivers’ cognitive performance. These findings emphasize the importance of sufficient sleep prior to driving in maintaining physiological and cognitive function.