

INTISARI

Bekerja di ketinggian dan paparan suhu panas dapat berpengaruh terhadap *postural stability* yang berpotensi meningkatkan risiko kecelakaan kerja. *Virtual reality* (VR) telah digunakan sebagai media simulasi untuk *balance training* selama bekerja di ketinggian, namun juga berisiko menimbulkan *cybersickness*, yang dapat mengganggu *postural stability*. Penelitian ini bertujuan untuk menganalisis pengaruh dari ketinggian virtual dan suhu lingkungan terhadap *postural stability* dan *cybersickness*, serta mengevaluasi hubungan antara *cybersickness* dan *postural stability*.

Penelitian dilakukan di laboratorium dengan melibatkan 15 partisipan laki-laki yang menjalani simulasi VR dalam enam kondisi yang merupakan kombinasi dari 3 level ketinggian virtual [rendah (2.4 m), sedang (22 m), dan tinggi (67 m)] dan 2 level suhu lingkungan [normal (25.76 °C) dan panas (32.88 °C)]. Parameter *postural stability* diukur secara objektif baik secara statis dalam bentuk *center of pressure* (COP) dan *static velocity* (V_{Static}) ataupun secara dinamis dalam bentuk *dynamic velocity* (V_{Dynamic}) dan *walking time*, sedangkan *cybersickness* diukur dengan menggunakan *Simulator Sickness Questionnaire* (SSQ).

Hasil penelitian menunjukkan ketinggian virtual dan suhu lingkungan berpengaruh secara bersamaan terhadap *postural stability*. Namun, pengaruh tersebut tidak terlihat saat berjalan dan hanya terlihat pada saat berdiri, khususnya di lingkungan bersuhu normal. Sementara itu, tingkat keparahan *cybersickness* dipengaruhi oleh ketinggian virtual dan suhu lingkungan. Selain itu, efek samping simulasi VR, yaitu *cybersickness* tidak memiliki hubungan dengan *postural stability* pada saat berdiri dan berjalan.

Kata kunci: *Postural Stability*, *Cybersickness*, *Virtual Reality*, Ketinggian Virtual, Suhu Lingkungan.

ABSTRACT

Working under exposure of heights and heat can affect postural stability which can lead to accident such as falling. Virtual reality (VR) has been used to simulate balance training during work at heights, but VR also carries the risk of causing cybersickness, which can disrupt postural stability. This research aims to analyze the effect of virtual heights and enviromental temperature on postural stability and cybersickness, also evaluate correlation between cybersickness and postural stability.

This research is conducted in laboratory involving fifteen male participant who underwent VR simulations in six conditions that were combinations of three levels of virtual height [low (2.4 m), medium (22 m), and high (67 m)] and two levels of enviromental temperature [normal (25.76 °C) and hot (32.88 °C)]. Postural stability's parameters are measured objectively either statically in the form of center of pressure (COP) and static velocity (V_{Static}) or dynamically in the form of dynamic velocity ($V_{Dynamic}$) and walking time, while cybersickness is measured by the Simulator Sickness Questionnaire (SSQ).

Results show that virtual height and enviromental temperature simultaneously affect postural stability. However, the effect is not seen when walking and is only seen when standing, especially in a normal temperature environment. Meanwhile, the severity of cybersickness is affected by virtual height and ambient temperature. In addition, the side effect of VR simulation, namely cybersickness, has no relationship with postural stability when standing and walking.

Keyword: Postural Stability, Cybersickness, Virtual Reality, Virtual Heights, Enviromental Temperature.