ASSESSMENT OF HEAT INTOLERANCE

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The heat tolerance test (HTT) suggested by Shapiro et al. is applied in the Israeli army (IDF) for every post-heat stroke or heat exhausted soldier, and whenever there is a suspicion of heat intolerance (HI). The HTT consists of exercise in a hot/dry climatic condition of 40°C, 40% relative humidity (RH). After 10-min rest, subjects perform a treadmill walking at a constant speed of 1.34m•s^{-1} at a 2% grade for 120 min; the physiological criteria for heat intolerance are rectal temperature (T_{re}) ≥ 38.5°C or heart rate (HR) ≥ 160bpm. The purpose of this study was to re-evaluate the test and consider broadening it. Nineteen post heat stroke male subjects participated in this study. 5-6 weeks after the collapse, they performed an HTT, and a week later, another test consisting of the same protocol but in comfort (20°C, 50% RH) climate conditions (CTT). T_{re} and HR were monitored every minute. Oxygen consumption (VO_2) was measured after 50 and 100 min of exercise and sweat rate (m_{sw}) was calculated from changes in body weight before and after the exercise, corrected for water intake and urine. The measured physiological variables (T_{re}, HR) were higher ($P<0.05$) during HTT in comparison to CTT, and the CTT results were not predictive for individual's tolerance to heat. No significant differences were found in m_{sw} and VO_2 between the heat tolerant (HT) and the HI groups or between the two climates.

Five subjects were categorized as HI with T_{re} of ≥ 38.5°C or HR ≥ 160bpm. Based on the physiological strain index (PSI) and the slope of these variables, another subject could be categorized as HI. Therefore, it is suggested that the criteria for HI during the HTT will be as follows:

T_{re} (°C)	HR (bpm)	PSI (units)
≥38.5	≥160	>7

During HTT, the slope was significantly higher ($P<0.05$) for both T_{re} and PSI in the HI group between the 60th-70th minutes of the HTT, and after the 50^{th} min throughout the HTT only for PSI. Absolute values of T_{re} and HR, without accounting for the dynamics of changes, are limited in their ability to assess HI. It is suggested that PSI, which accounts for both the absolute value and the change during the exposure, is a more suitable index for the assessment of HTT.

In conclusion, CTT is not essential for the assessment of heat intolerance. Adding the PSI and its slope in the assessment of heat intolerance strengthens the criteria and assures also that the change in T_{re} and HR and their dynamics during the test will be included in the evaluation.

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