

ABSTRACT

MODIFICATION OF WET & BULB GLOBE TEMPERATURE (WBGT) INDEX FORMULA AND DETERMINATION OF HEAT STRAIN INDICATOR FOR WORKER EXPOSED BY HEAT STRESS

DENNY ARDYANTO

The objectives of the research were to determine heat strain indicator other than core temperature and to discover mathematical formula which could develop new indicator of WBGT Index and threshold limit value being appropriate for workers in Indonesia. The research was a model development study with cross sectional design and an inferential analysis was used for analyzing the data.

The research was conducted in glass, steel, and home industries whose sample size were 122 workers. Workers who experienced heat strain were 26 persons (21,3%). Discriminant analysis showed that beside core temperature, pulse could be used as an indicator of heat strain. Its critical point was 7 pulses/minute if baseline pulse was known, otherwise the critical point was 105 pulses/minute. Based on confirmatory analysis, mathematical formula for WBGT index was got. The formula was $(0.32 \times \text{wet temperature}) + (0.37 \times \text{dry temperature}) + (0.31 \times \text{globe temperature})$. Based on regression analysis was derived threshold limit value of modified WBGT index was 37.1°C. However, the value of former WBGT index was 33.3°C. If wind velocity was <0.5 m/sec and humidity was $<58.6\%$, threshold limit value of modified WBGT index derived was 42.75°C while the value of former WBGT index was 38.95°C. Furthermore, threshold limit value of modified WBGT index was 35.0°C while the value of former WBGT index was 31.82°C if wind velocity was ≥ 0.5 m/sec and humidity was $<58.6\%$. And then, threshold value of modified WBGT index was 35.45°C while the value of former WBGT index was 32.50°C if wind velocity was ≥ 0.5 m/sec and humidity was $\geq 58.6\%$.

Through discovering the formula, measurement of heat strain becomes more appropriate for workers in Indonesia. So, it must be made a measure of engineering control.

Key words: heat stress, heat strain, threshold limit value, WBGT index