

Risk of Heatstroke Occurring in Indoor Built Environment Determined with Nationwide Sports and Health Database and Meteorological Outdoor Data

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Abstract : The paper describes how the frequencies of heatstroke occurring in indoor built environment are related to the outdoor thermal environment with big statistical data. As the statistical accident data of heatstroke, the nationwide accident data were obtained from the National Agency for the Advancement of Sports and Health (NAASH) . The meteorological database of the Japanese Meteorological Agency supplied data about 1-hour average temperature, humidity, wind speed, solar radiation, and so forth. Each heatstroke data point from the NAASH database was linked to the meteorological data point acquired from the nearest meteorological station where the accident of heatstroke occurred. This analysis was performed for a 10-year period (2005–2014). During the 10-year period, 3,819 cases of heatstroke were reported in the NAASH database for the investigated secondary/high schools of the nine Japanese representative cities. Heatstroke most commonly occurred in the outdoor schoolyard at a wet-bulb globe temperature (WBGT) of 31°C and in the indoor gymnasium during athletic club activities at a WBGT > 31°C. The determined accident ratio (number of accidents during each club activity divided by the club's population) in the gymnasium during the female badminton club activities was the highest. Although badminton is played in a gymnasium, these WBGT results show that the risk level during badminton under hot and humid conditions is equal to that of baseball or rugby played in the schoolyard. Except sports, the high risk of heatstroke was observed in schools houses during cultural activities. The risk level for indoor environment under hot and humid condition would be equal to that for outdoor environment based on the above results of WBGT. Therefore control measures against hot and humid indoor condition were needed as installing air conditions not only schools but also residences.

Keywords : accidents in schools, club activity, gymnasium, heatstroke

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