A study on heat stroke prevention in environment-friendly campus

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Today, with temperatures rising due to global warming, the acceleration of the heat island phenomenon in the city has heightened the incidence of heat stroke. Our study focuses on heat stroke in relation to the thermal environment of school campus common areas in both the city and suburban campus.

We have proposed measures which could help reduce the risk of heat stroke in the campus. We also report on the measures that can be taken towards establishing a global environment-friendly campus. Using heat environment support soft Thermo Render 3, we determined the present conditions of the warm temperature environment of both the campuses. As for temperature change due to height from the ground, it was approximately 3 ℃ between 0.1 m and 1.8m, depending on the difference in materials of the ground. Wet-bulb globe temperature (WBGT) level is the index that adds the considerable influence to the human body of radiant heat and three elements of the humidity to the heat balance. When the WBGT level of Chuo Garden was compared with those of the other measurement spots, the value was found to be the smallest with comfortable space. Also comparison with the present pavement using simulation analysis showed that a water retentive pavement reduced WBGT by approximately 14℃.

In addition, it decreased from the present 65℃ to 42℃ when we increased the number of trees. Furthermore, that of the neighboring ground decreased approximately 35℃ to 21℃ when a lawn was laid under the tree. This is effective through the evaporation chilling effect. In addition the use of water-holding pavement as well makes it green.

The difference of thermal capacity of the materials of the ground and the quantity of sunlight had a great influence together with temperature, humidity, wind velocity on heat stroke degree of risk and could be used as countermeasures for heat stroke prevention for an environment-conscious campus.

The most important characteristic of this report, the Green Coverage Ratio is seen as a useful index for the decrease of the WBGT. It is desirable to make green coverage ratio more than 45% to reduce WBGT level to one under 28 ℃ on an extremely hot day. We are developing an environmental design technique using green coverage ratio for heat stroke prevention in a particular environment.