

'Even below 35°C, temperatures can prove fatal with Goa's high humidity'

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Panaji: Goa may soon be heading towards a climate catastrophe that will potentially harm human health and may even lead to fatalities, scientists have warned.

Experts had already said Goa's temperature at 40°C may soon be the new normal in the climate change scenario.

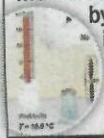
► **Min, max temps rise, no respite from heat so soon, P 5**

rio. But now, they have raised a serious concern that in Goa, with a high humidity of 70% or more, even 35°C could prove fatal.

A recent widely-accepted

WHAT IS WET BULB TEMPERATURE?

Wet bulb temperature estimates the effect of temperature, relative humidity, wind speed, and solar radiation on humans using a combination of temperatures from three thermometers. A Wet bulb measures the temperature read by a thermometer covered in a wet cloth. As water evaporates from the cloth, evaporation cools the thermometer



international study has shown that 'wet bulb temperature' (heat measured with humidity) of 35°C could harm even young and healthy individuals.

The India Meteorology Department's (IMD) weather updates and forecasts only provide dry bulb temperatures, which means humidity is not taken into consideration along

with the heat. Humidity is read as a separate parameter altogether. This will mean Goa authorities will not have any alert on when the state touches the wet bulb temperatures of 35°C, and thus precautions cannot be put in place.

Scientist from BITS-Pilani Goa campus Rajiv Kumar Chaturvedi, who studied Goa's temperature over 100 years for the state action plan for climate change (SAPCC), said that the plan could not make any predictions of wet bulb temperatures or taking heat and humidity as a combined factor, due to the lack of such records by IMD.

► **'Precautions', P 5**

'Wet bulb temperature will help state take precautions'

► From P 1

Wet bulb temperature of 35°C is the absolute threshold of human endurance. If any human being is outdoors during such wet bulb temperatures for six hours, then he or she will not survive," said Chaturvedi.

In April last year, 13 people died and 50 were hospitalised due to heat wave at an open air event in Kharghar, Navi Mumbai, where the temperature was just 38°C.

Chaturvedi said that IMD needs to start measuring heat and humidity together at the earliest in this climate change scenario, so that precautions can be put in place to save lives.

"Our humidity levels are consistently high between 70-100% because we are so close to the ocean. We should therefore get IMD and others to start measuring wet bulb temperature. On March 29, the minimum temperature was 26.8°C while humidity was 93%. The temperature on Saturday was 30°C but feels like 39°C because of the 83% humidity," said Chaturvedi.

This is the first time that a study has tested the threshold of wet bulb temperatures physiologically. The internationally-published research paper 'Evaluating the 35°C wet-bulb temperature adaptability threshold for young, healthy subjects', by researchers Daniel J Vecellio, S Tony Wolf, Rachel M Cottle, and W Larry Kenney is now providing a new perspective of climate change on human well-being.

"In Goa, temperatures are already hitting 37-39°C. This is very high for a place like Goa and is a big problem. In Karachi, temperatures have hit 54°C, but people are surviving there only because humidity is low, which is not the case with Goa," said Chaturvedi.

Without the wet bulb temperature figures, the current weather reporting in Goa is a misnomer, he said.

"If you measure the wet bulb temperature, it will help the state take precautions like temporarily shutting

A MATTER OF LIFE AND DEATH



Dangers for Goa

► At present, IMD provides data of only dry bulb temperatures, which see humidity as a separate parameter altogether

► The combined impact of humidity and temperature is not seen

► Exposure to the outdoors for six hours at 35°C and humidity of over 70% can prove fatal to humans, as per Lancet data

► A year ago, at an open air event in Kharghar in Navi Mumbai, at just 38°C, 13 people died and 50 were hospitalised due to a heat wave

► The most comfortable temperature for

humans is 20-27°C, with 35-60% humidity

► High levels of humidity inhibits the body's ability to cool itself through sweating, as a result of which even lower temperatures feel much hotter in humid environments

► To prevent danger to human health, daily temperature readings must integrate humidity in their reporting

► Comfortable indoor and outdoor living and working spaces need to be created considering different aspects of wind, humidity, and ambient temperatures



down markets or installing fans in public areas, which can help save lives," said Chaturvedi.

A Lancet study found a 55% spike in fatalities in India between 2000-2004 and 2017-2021 due to extreme heat.

The Study

► 'Evaluating the 35°C wet-bulb temperature adaptability threshold for young, healthy subjects' by Daniel J Vecellio, S Tony Wolf, Rachel M Cottle, W Larry Kenney

► It tested for the first time the theory that a wet-bulb temperature of 35°C is the limit to human adaptability to extreme heat, a growing concern in the face of continued and predicted accelerated climate change

► This study examined the critical wet-bulb temperature at which heat stress becomes uncompensable in young, healthy adults performing tasks at modest metabolic rates mimicking basic activities of daily life

► Across six experimentally determined environmental limits, no subjects reached the 35°C limit and all means were significantly lower than the theoretical 35°C threshold

► In summary, a wet-bulb temperature threshold in high humidity is well below 35°C

► This study is the first to use empirical physiological observations to examine the well-publicised theoretical 35°C wet-bulb temperature limit for humans in extreme environments

► We find that uncompensable heat stress in humid environments occurs in young, healthy adults at wet-bulb temperatures significantly lower than 35°C, the study stated

On July 16, 2023, an extremely dangerous wet bulb temperature of 33.7°C was recorded in Asaluyeh, Iran.