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Extreme heat linked to diabetes in pregnant women, thyroid disorders: Study

Shabana Begum

There are links between extreme temperatures and gestational diabetes in pregnant women, as well as between heat and thyroid disorders.

This is according to studies carried out in recent years that have examined the effect heat has on hormones – the chemicals that coordinate and affect hundreds of bodily processes.

Hormones, from insulin to oestrogen, play a role in nearly all biological functions, including blood sugar control and fertility, and all key life stages such as puberty and pregnancy.

A 2017 US study found that higher temperatures can affect the amount of glucose that is broken down into energy, increasing the prevalence of diabetes.

Scientists from Singapore and Britain, who recently concluded a review of medical research since the 1940s, found evidence of heat affecting hormones and the endocrine system – the system in charge of creating and releasing those hormones.

For pregnant women, data shows that heat increases the risk of premature birth, low birth weight, stillbirth and gestational diabetes, said Associate Professor Jason Lee from the NUS Yong Loo Lin School of Medicine (NUS Medicine), who was involved in the research.

This could be due to inflammation and reduced blood flow to the uterus as more blood is channelled to the skin to help the body cool down, but further study is required.

"Basically we know the impacts, but the 'why' and 'how' are lacking," said Prof Lee, who is also director of the Heat Resilience and Performance Centre at NUS Medicine.

The research team from Singapore and Britain went through decades of medical data to examine the lesser-known impacts of heat and spur more research on its long-term effects on the endocrine system, amid soaring temperatures and climate change.

Existing research summarised by the scientists has so far centred on short-term heat exposure of humans, mice, cows, sheep and other animals.

Professor Fadil Hannan from the Nuffield Department of Women's and Reproductive Health at the University of Oxford, lead author of the study, said: "We know very little about whether increased heat exposure due to climate change could affect endocrine health.

Singapore and British researchers, who recently concluded a review of medical research over decades, found evidence of heat affecting hormones and the endocrine system, which creates and releases hormones. ST FILE PHOTO

"This is particularly important for patients living in hot climates, who may have inadequate access to cooled environments."

The study was published in medical journal Nature Reviews Endocrinology on July 30.

The paper stated that early life exposure to high temperatures might have adverse effects on child health.

Pregnant rats exposed to a temperature of 43 deg C for 15 minutes had pups with brain malformations in association with a decreased size of their adrenal glands – glands on top of the kidneys that produce a variety of hormones.

Professor Melvin Leow, a senior consultant at Tan Tock Seng Hospital who was also involved in the study, said heat and diabetes could be linked in the following way: Heat stress increases the circulation of steroids from the adrenal glands and this eventually causes the liver to produce more glucose.

This alters the distribution of body fat and increases insulin resistance.

When asked about the temperature threshold over which extreme heat affects hormones, Prof Lee said: "I doubt there is a fixed temperature threshold.

"It is the same argument for those looking for that threshold that will kill humans. There is no such number, and thinking that way can be dangerous. We will assume temperatures lower than that threshold will be safe."

In Singapore, days are designated as high heat stress days when the hourly average Wet Bulb Globe Temperature (WBGT) is equal to or greater than 33 deg C.

WBGT readings indicate how hot the human body feels, taking into account not just air temperature, but also humidity, wind speed and solar radiation.

Heat's effects on fertility are better known – heat affects the reproductive cells, lowering sperm count and motility, and affecting women's ovulation cycle and egg quality.

A separate NUS study named Project HeatSafe, led by Prof Lee, found that men who were exposed to temperatures above 29.8 deg C within three months of providing their sperm samples had a 46 per cent higher risk of low sperm count.

For Singapore women, however, HeatSafe did not find a link between extreme heat and gestational diabetes. Mothers-to-be here tend to take more protective measures, such as ramping up air-conditioning.

Patients with endocrine disorders such as diabetes and hyperthyroidism are also at greater risk of heat illnesses, the paper noted. And that raises their risk of hospitalisation, which increases the burden of heat on the health system.

Prof Fadil explained: "Patients with diabetes may not be able to dissipate heat effectively due to reduced (skin) blood flow. They are additionally at risk of fluid loss and dehydration."

Some endocrinologists and women's health doctors in Singapore said they have yet to see strong links between heat and their patients' conditions.

Dr Peter Eng, from the Peter Eng Endocrine Clinic, said: "Changes in hormones are complex and due to multiple factors, so it would be difficult to attribute any hormone change to heat alone."

Associate Professor Chan Shiao-Yng, senior consultant at the National University Hospital's Department of Obstetrics and Gynaecology, said: "Heat has been linked to poor pregnancy outcomes, but we are lacking robust trials to show that cooling strategies could decrease such risks.

"It is not so much that rising global temperatures and extreme weather events cause hormonal dysregulation, but that these climatic changes could exacerbate the signs and symptoms of endocrine disorders."

nshab@sph.com.sg

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