Ultraviolet rays believed to prevent chickenpox spreading

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(Medical Xpress) -- Ultraviolet rays help prevent the spread of chickenpox, meaning people in milder climates are more at risk of catching the disease, according to new research. The discovery could lead to new ways of preventing chickenpox and its more severe relative, shingles.

A researcher at St George's, University of London has found that chickenpox is much less common in places with high UV ray levels, compared with those with low levels.

It has long been known that UV rays can inactivate viruses. However, virologist Dr Phil Rice believes his findings indicate that UV rays could inactivate the varicella-zoster virus – the herpes virus responsible for chickenpox and shingles – on the skin before it transmits to another person. This explains why there is less transmission in the tropics, where chickenpox is much less frequent than in temperate countries. It would also explain why chickenpox peaks in temperate zones – where it is seasonal – in winter and spring, when UV rays are lowest.

Previously, it was thought that geographical differences in chickenpox incidence were related to heat, humidity, population density, or infection with other viruses that protect against it.

Dr Rice examined data from 25 studies on varicella-zoster virus prevalence patterns in both temperate and tropical areas across the globe. He plotted the data against a range of climatic factors, to examine what might be the most likely causes of increased prevalence. The data showed that – once other factors were ruled out – UV rays were the only factor to match the infection patterns in each country studied.

Dr Rice, whose study has been published in *Virology Journal,* said: “No one had considered UV as a factor before, but when I looked at the epidemiological studies they showed a good correlation between global latitude and the presence of the virus.

“One convincing factor of the hypothesis is that there was an explanation for every anomaly. For example, the peak incidence of chickenpox in India and Sri Lanka is during the hot, dry, sunny season. You would expect chickenpox to be at its lowest at this time, so at first this didn’t fit the theory. However, this was explained because UV rays are actually much lower in the dry season compared with the monsoon period. In the dry season, the pollution in the atmosphere reflects the UV rays back into space before they reach us. But in monsoon season, the rains wash

away the pollution, meaning the UV rays can get through."

Dr Rice also believes his findings show why two distinct genetic types of the virus have formed – a temperate type and a tropical one. He found that the temperate genotype only transmitted in the tropics when UV radiation was either reduced or negated. It was found to transmit in the home, for example, but not outside. The tropical genotype, however, was found to transmit in the tropics in the presence of UV rays, suggesting it has some resistance. Dr Rice believes this is because the temperate virus line – which broke off from the original tropical genotype – has lost the UV resistance still present in the tropical line.

"For the temperate virus line to have lost the selective advantage of resistance to UV rays as it broke off from the original tropical virus, it must have gained an advantage in the virus life cycle as an evolutionary trade off. An obvious advantage would be an ability to reactivate more easily, as shingles. The virus can only have one of these survival advantages, not both. This might explain why shingles appears to be so much less common in people from the tropics, and why the temperate virus reactivates much more readily than the tropical type."

When the existing chickenpox vaccine was created in the 1970s, it was not known that there were two types of the virus. Dr Rice believes his findings could aid the development of new treatments for chickenpox and shingles, which causes considerable pain and discomfort in later life. He says further studies are needed to fully examine the effect of UV rays on the virus.

More information: The study can be read here: www.virologyj.com/content/8/1/189