

UK-India study: Arsenic in rice cause genetic damage

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Bangalore: Scientists at the University of Manchester in collaboration with CSIR-Indian Institute of Chemical Biology in Kolkata, India, have demonstrated a link between rice containing high levels of arsenic and chromosomal damage in humans consuming rice as a staple.

The scientists measured chromosomal damage by micronuclei in urothelial cells. Because most human cells have one nucleus that contains 46 chromosomes, if any part of these chromosomes is damaged, the part that is unable to participate in cell division typically remains as small "micronuclei" in any daughter cells. Importantly, groups of researchers have linked increased frequency of these micronuclei to the development of cancer.

The study was conducted by screening more than 400,000 individual cells extracted from urine samples from volunteers. Based on their results the researchers determined that people in the rural parts of Indian state West Bengal eating rice as a staple with greater than 0.2 mg/kg arsenic showed higher frequencies of micronuclei than those consuming rice with less than this concentration of arsenic.

By choosing a study population with relatively similar dietary and socio-economic status otherwise not exposed to arsenic, the team, funded by the UK India Education and Research Initiative (UKIERI), demonstrated that the trend of greater genetic damage with increasing arsenic in rice was observed for both men and women, for tobacco-users and non-users and for those from three different locations within the study area. However, it's unclear how the results translate to individuals for whom it's not a staple and with overall nutritional diets.

Dr Ashok K. Giri, who led the Indian research team, argues that while a concern, the scenario does not represent a full-blown public health crisis, especially as proper measures are taken to avoid further contamination. He added, "Although high arsenic in rice is a potential threat to human health, there should not be any panic about the consequences, particularly as the health risks arise from long-term chronic exposure. We can avoid high arsenic rice by taking proper mitigation strategies for rice cultivation; moreover, one CSIR institute in India has already identified a number of Indian rice varieties which accumulate lower concentrations of arsenic, so we can easily address future human health risks with proper mitigation."