

HEALTH SCIENCES: chronic diseases

Arsenic just got dirtier

Exposure to arsenic also increases risk of hypertension

SONAL MATHARU

IT IS well-known that prolonged exposure to arsenic causes cancer, diabetes and liver damage. Now it has been found that exposure to this colourless, odourless chemical, which is widely present in the environment, may also lead to hypertension.

For establishing the link, a team of researchers from the US selected 11 studies published between January 1996 and March 2011. Eight studies were conducted at moderate to high levels of exposure (average levels in drinking water $\geq 50 \mu\text{g/l}$) and three studies were conducted at low levels of exposure ($< 50 \mu\text{g/l}$) of arsenic to people. WHO standard for the arsenic level in drinking water is $10 \mu\text{g/l}$. Eight of these studies



HEALTH SCIENCES/CFSE

assessed the hypertension-arsenic link.

Researchers found that five of the eight studies made a positive association between hypertension and arsenic. For example, two studies from areas with high-arsenic levels in southwestern Taiwan and Bangladesh and two studies conducted in low-level areas in Wisconsin and central Taiwan showed consistent rise in hypertension with increasing arsenic exposure.

The review paper published in the April 2012 issue of *Environmental Health Perspectives*, notes that given the widespread arsenic exposure through

drinking water and food, even a modest effect of arsenic on hypertension could have a substantial impact on morbidity and mortality. If the link between hypertension and arsenic is established, it would partly explain the high numbers of high blood pressure cases in the world. High blood pressure caused 51 per cent of stroke deaths and 45 per cent of coronary heart disease deaths, according to WHO's World Health Statistics 2012, released in May.

The findings are important for India as well, as arsenic contamination here is widespread in the Ganga and the Brahmaputra river basin. In 2010, studies showed that six million people are exposed to arsenic-contaminated groundwater in West Bengal. "Though people are mildly exposed to the chemical, the seriousness of the issue cannot be ruled out," says D N Guha Mazumder, former adviser with Arsenic All India Institute of Hygiene and Public Health in Kolkata.

Guha conducted the first study on arsenic-hypertension link last year in Nadia district in West Bengal. The study, which is yet to be published, found high blood pressure among people exposed to arsenic in the area. ■

LIGHT ON INDIA'S FOURTEENTH METEOR SHOWER



The Vidarbha region in Maharashtra was hit by a meteor shower on May 22. It was no spectacle—it came between 2 pm and 2.30

pm—in the hottest part of the day and month. Bizarre fallouts were reported. In Warud in Amravati district, the windscreen of a moving car melted. In Karanja in the same district, a truck and a car collided with a road divider due to the loud, explosion-like noise. In Katol in Nagpur tin sheds were pierced by the sheer force of falling fist-sized meteorites. BINOD KUMAR, deputy director of Geological Survey of India talks to APARNA

What are meteors and what insights can they give?

Meteorites are part of the solar system, and have a composition similar to that of the earth—both are formed from solar nebula. Chemical and mineral analysis of meteorites may reveal interesting insights into the age of the solar system, the interior of the earth and so on. Many meteorites are found to contain iron and nickel, which make up the core of the earth, so it is like indirectly looking at the core. Others contain silicates. There is always a chance that some may contain unique material unknown to us. Meteorite material is extremely precious, because it originates from the same source as the earth.

How frequent are meteor showers?

They are not very rare. This is the 14th shower recorded in the country. The first shower recorded in Marana in

1856. Odisha and Kodaikanal saw showers in 2003 and 2008 respectively. But they are unpredictable.

What was the area of impact of the latest meteor shower?

All the information is yet to come in. The area of impact appears to be a radius of about 150 km, from Akola in the west to Amravati in the east. Till date we have found five meteorites from Katol, and a sixth from Wardha is awaited. We will then study them.

What can be the implications of a meteor shower for common people?

There are not too many implications, unless the shower is too radioactive, in which case there could be fallouts similar to nuclear disasters. At best they can cause a safety hazard like the ones in Amravati or a spectacle. The implications are mostly academic and scientific in nature.

Pray before you spray

Household cleaning products cause cardiac diseases

SMRITI SHARMA

LOVE to sweeten the air in your room with fresheners? Beware. A study has found that people who use air fresheners or other household cleaning products which contain aerosol propellants, formaldehyde, as little as once a week, experience reduced heart rate variability (HRV)—a condition linked to heart attack and high blood pressure.

Cardiovascular diseases are one of the major causes of mortality in both developed and developing countries. Though household sprays and scented

ening sprays and scented products. The exposure time ranged from four to seven days per week. The researchers then analysed the interval between heart beat using ECG. They also took into consideration amount and speed of air that can be inhaled and exhaled. The exposed participants had a reduced 24-hour variation in heart beat which points to a developing heart disease as compared to unexposed patients.

“Our study is the first-of-its-kind that correlates the cardiac effects of household cleaning sprays,” says Probst Hensch, one of the researchers. The



CORISTY CHROMA/CORBIS OUTLINE

products have earlier been associated with respiratory problems their cardiac effects are largely unknown.

Researchers at the National Institute of Environmental Health Sciences in the US studied 581 homemaker women who were taking part in a long-running Swiss study on air pollution. Their medical history (presence of asthma, shortage of breath at higher altitudes and medications undertaken) was also taken into consideration before initiating analysis. Eighty-eight per cent of the total people surveyed were exposed to household cleaning products, while the rest were unexposed. The exposure was primarily of cleaning sprays, air fresh-

study was published online in the April 2012 issue of *Environmental Health Perspectives*.

Reviewing the study, S Z Abildstorm, researcher at National Institute of Public Health in Denmark, says, “The study sheds light on the increasing risk of cardiac disorders as a result of constant exposure to indoor volatile irritants.” Anoop Mishra, head of department of diabetes and metabolic diseases at Fortis Hospital in New Delhi, adds, “The results indicate a newer mechanism whereby people are suffering from cardiac conditions. The mechanisms need to be studied and validated by more precise methods.”

nogenerator technology electric material. These ce electricity when bent, pressed. To build the the scientists dispersed of barium titanate along omaterial in a chemical ce nanocomposite. The was cast onto metal substrate and cured in

ure was applied the produced about 1.5V storing the produced ors, it can generate 2.37 to drive standard light-

reveal that their nano-

d
tors can be
l into clothes to
rgy from the
f a person

r than their predeces-
or is simple, low-cost
face area,” states the
Keon Jae Lee from
Institute of Science

results expand the fea-
vered energy systems
consumer electronics,
biomedical devices
iting in indoor envi-
earch was published
e of the *Advanced*

application of nano-
been creating much
their use in clothing.
generators, similar to
y the Korean team,
ed into clothes and
powered generators
energy by just the
person wearing it.
n turn be used to
ble devices such as
3 player.

are some limitations
They produce very
power. “We believe
ved in a short time,
under way to solve
ee. ■

CHEMICALS BLACKLIST

Research on obesogens is still in its infancy. Scientists are looking at all kinds of chemicals with suspicion. A decade of research has identified about 20 chemicals present in the environment as obesogens. A look at some of the chemicals and how they make one fat

Genistein

Found in soy products like milk and baby formulae

How it makes one fat: Disrupts endocrine functioning and mimics female sex hormone estrogen, which is involved in fat distribution and causes more fat storage

Source: *Environmental Health Perspectives*, March 2008

Clozapine

Anti-psychotic drug used to treat schizophrenia

How it makes one fat: The drug activates enzymes in the hypothalamus which lead to higher food intake. It also triggers other metabolic changes that lead to weight gain

Source: *PNAS*, February 2007

Bisphenol A (BPA)

Used in plastic and baby bottles and in sealing food cans

How it makes one fat: Studies suggest that BPA affects genes responsible for production of fat cells. It increases both the number and size of fat cells in adults; even pre-natal exposure can lead to fatter babies

Source: *Environment, Epigenetics and Reproduction*, May 6, 2012

Dioxin

Released during waste incineration and manufacture of plastics

How they make one fat: Disrupts endocrine functioning. They also increase the risk of diabetes

Source: *Diabetes Care*, May 2008

Organotins

Used as heat stabilisers in plastics and in water pipes. Earlier employed as biocide and anti-fouling agent

How it makes one fat: Organotins like tributyltin chloride interfere with the activity of receptors on stem cells that control cell differentiation and affect glucose and lipid metabolism

Source: *Endocrinology*, June 2006

Arsenic

Chemical present in rocks and soil; percolates into groundwater and accumulates in crops

How it makes one fat: Targets mitochondria, a cell organelle associated with energy metabolism and slows the process. Linked to diabetes

Source: *Nutrition*, November 1997



Polycyclic Aromatic Hydrocarbons (PAHs)

Chemicals in coal and gasoline. Released on incomplete combustion of fuel and cigarette smoking.

How it makes one fat: Prevents normal breakdown of fat cells. Pre-natal exposure can lead to overweight children.

Source: *American Journal of Epidemiology*, April 2012

Nicotine

The addictive chemical in tobacco.

How it makes one fat: Pre-natal exposure to nicotine smoke induces weight gain in offspring by altering energy metabolism.

Source: *Obesity Research*, April 2009

Fructose

A sweetener.

How it makes one fat: Decreases insulin sensitivity and increases visceral fat deposition.

Source: *Journal of Clinical Investigation*, May 2009

Bisphenol A

Used to make plastic supple and in food packaging, furniture, toys, and medical devices such as intravenous bags.

How it makes one fat: Interferes with the activity of receptors on stem cells that control cell differentiation.

Source: *Molecular and Cellular Endocrinology*, May 2009

Endosulfan

Preservative used in food, pharmaceutical and personal care products.

How it makes one fat: Possibly an endocrine disruptor. It increases formation of fat cells.

Source: *Molecular and Cellular Endocrinology*, April 2012

Monosodium glutamate (MSG)

Popularly called ajinomoto, it is a flavour enhancer and widely used in Chinese food, canned vegetables and processed meat.

How it makes one fat: Affects the hunger pathways involving hypothalamus in the brain. It reduces the release of leptin, a hormone that induces feeling of satiety and increases food consumption.

Source: *Obesity*, May 2008

Perfluorooctanoate (PFOR)

Synthetic chemical used to make non-stick cookware and stain-resistant carpets.

How it makes one fat: Interferes with the functioning of thyroid gland, estrogen and activity of receptors on stem cells that control cell differentiation.

Source: *Molecular and Cellular Endocrinology*, May 2009

Atrazine

Used as herbicide, and is absorbed by the soil and enters the food chain.

How it makes one fat: Targets mitochondria, a cell organelle associated with energy metabolism and slows this process.

Source: *PLoS ONE*, April 2009

Dichlorophenol

Pesticide which enters the food chain through water and food.

How it makes one fat: Mechanism is unknown, but children with high levels of this chemical in urine were found to be fatter.

Source: *Review of Environmental Health*, July 2011

DDT

A popular insecticide used to control malaria in developing countries. Enters the food chain through water and soil.

How it makes one fat: Its breakdown product DDE is an endocrine disruptor and interferes with the activity of estrogen.

Source: *Occupational and Environmental Medicine*, December 2008

