

Low-arsenic rice discovered in Bangladesh could have major health benefits

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Millions of people worldwide are regularly exposed to arsenic through drinking water and eating rice grown in soil and water containing high amounts of arsenic. Long-term exposure can lead to the development of different types of cancer as well as serious cardiovascular, neurological, and other health problems. Scientists have now identified aromatic rice from Bangladesh that has far lower arsenic concentrations than found in non-aromatic rice. The other important benefit is that it contains higher amounts of selenium and zinc. The discovery is reported in *Biomedical Spectroscopy and Imaging*.

Rice is the staple food of over three billion people. Because the rice plant is highly efficient at absorbing arsenic from soil and water, it is reported to be the highest arsenic-containing cereal. For Bangladeshis, rice is their staple food and they consume on average half a kilogram of rice daily.

A team of scientists led by Dr. Parvez Haris from De Montfort University, Leicester, UK is carrying out research to remove arsenic from water and to identify ways of reducing human exposure to arsenic through diet.

Haris and his team have already demonstrated that exposure to the more toxic inorganic arsenic species is greater in people who eat more rice. In this latest work, published in *Biomedical Spectroscopy and Imaging*, the De Montfort University team – along with Dr Michael Watts from the British Geological Survey, Keyworth, Nottingham, UK – has identified

varieties that are low in arsenic but high in essential trace elements such as selenium and zinc.

Earlier studies showed high concentrations of arsenic in Bangladeshi rice, but the rice samples were mainly from regions where the [irrigation water](#) contains higher levels of arsenic. The team carried out a detailed study on rice from the greater Sylhet region in the north-east of Bangladesh, which generally has a lower [groundwater arsenic](#) concentration. The team analyzed 98 rice samples using a technique called Inductively Coupled Plasma - Mass Spectrometry (ICP-MS) to determine total arsenic and also arsenic species in a selected group of samples.

The results showed Sylheti rice to have a far lower arsenic concentration than similar types of rice from other regions of Bangladesh. Results also showed that the arsenic concentration in aromatic rice was 40% less than non-aromatic varieties and that it also contained higher concentrations of the essential elements selenium and zinc.

"This is a very important finding since consumption of certain types of aromatic rice will not only reduce human exposure to arsenic, but will also increase their intake of zinc and selenium," says Dr Haris. This is very good news for millions of Bangladeshis who are exposed to high concentration of arsenic through drinking water and rice and are also deficient in zinc and selenium.

"We seem to have found one of the lowest arsenic-containing rice ever reported in the literature," he continues. Several varieties of Sylheti aromatic rice even had lower arsenic than the well-known Basmati aromatic rice from India and Pakistan."

For someone consuming 500 grams of non-aromatic or aromatic rice from Sylhet, the daily intake of arsenic from rice would be

approximately 48% and 69% lower, respectively, compared with consuming non-aromatic rice from other parts of Bangladesh.

"Bangladeshis are proud of their diet and often refer to themselves as 'mache bhathe Bangali' which can be roughly translated as 'fish and rice makes a Bengali.' Our identification of rice with very low arsenic concentration and higher quantities of essential elements is good news for the Bangladeshis and other communities where rice is a staple food but it is important to encourage a more balanced diet that is less dependent on rice," Haris explains.

Aromatic rice is generally cultivated during the wet (aman) season and therefore is less dependent on the use of groundwater for irrigation. It also requires less fertilizer and pesticides. Haris recommends that the authorities in Bangladesh encourage farmers to cultivate more aromatic rice. Although the yield of aromatic rice is lower, the farmers will not need to spend much money on applying chemicals that could pollute the environment and harm their own health. "Furthermore, energy costs (electricity or diesel) will be lower as there will be less need for them to pump groundwater for irrigation," Haris says.

The impact of this finding may also have health implications for other groups of people who eat large quantities of rice daily. "This type of rice could be used in infant foods instead of rice with higher [arsenic](#) concentrations. It could also benefit people suffering from celiac disease who consume rice-based foods on a regular basis. Therefore, it is essential that further research on aromatic rice from different parts of Bangladesh and other regions of the world are conducted," concludes Dr. Haris.

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