

Fluorosis

Crippling the innocent

It was in 1930 that fluoride was discovered in groundwater in India. By 1937, the first scientific paper was published. Western countries introduced fluoride into their drinking water and toothpaste promoting it as being beneficial for teeth.

But as scientific knowledge grew, the adverse effects of too much fluoride on the human body have become more evident. Fluoride is toxic and accumulates in the body. Ingesting too much fluoride can result in a condition known as fluorosis.

“People do not die immediately. They die a little each day inch by inch. They may live 70 years with an unproductive life, a painful life. It is so sad to see a man lying on a bed paralysed and you can do nothing for him,” said Professor A. K. Susheela, one of the world’s leading authorities on fluoride and its effects.

“It would be better if the fatality rate was high, because then, there would be less suffering and the death toll would catch the attention of the government. Here, everybody suffers. They lead an agonising life until the end.”



Professor Susheela has had many years of dedicated research and copious scientific publications under her belt that have been duly recognised and rewarded with numerous prestigious awards both at home in India and internationally.

One such award is the Ran Baxy Research Foundation Award for outstanding research in medical sciences. She also had the honour of addressing the British Parliament in the House of Commons.

Professor Susheela worked for many years at the All India Institute of Medical Sciences in New Delhi. While there, she realised few scientists were working on this crippling disease. In 1993, the professor established the Fluorosis Research and Rural Development Foundation (FR & RDF) in New Delhi, and became its executive director.

The FRRDF is now well established, caring for many not just in India, but also internationally where with the aid of the internet, Professor Susheela’s expertise is in demand from people all over the world including the US, UK and Australia.

Professor Susheela notes that fluoride and fluorosis is very serious and a growing concern. Nineteen of India’s 35 states have so far been found to have their groundwater affected by fluoride.

“Following a survey conducted here in 1998, it was found that 60 million people were affected by fluoride in India. Now I would estimate that figure to be about 75 million with six million being children under the age of 14.”

► Another victim of fluoride poisoning in India. It is a condition that today, has no cure as yet.

◄ Villagers are exposed to elevated levels of fluoride in their drinking water that comes from groundwater. The problem is, fluoride is a naturally occurring element that accumulates in groundwater in some areas in India and other parts of the world..



Fluoride is a naturally occurring element that is found in the groundwater of various regions of the world. Levels can vary due to geological processes, such as the weathering of fluoride-bearing minerals. Hydro-geological conditions can also lead to higher fluoride levels in groundwater in certain areas, which become endemic for fluorosis.

Many people in the developing world rely on tube wells that tap into underground aquifers to access their drinking water supply. Unbeknownst to them, the groundwater they rely on could be contaminated with high levels of fluoride.

The World Health Organization's (WHO) safe limit for fluoride in drinking water is 1.5 mg/lit, but Professor Susheela thinks otherwise. "In this part of the world, people drink between five and six litres of water per day, and we have many children with 0.3 mg/lit in their water supply developing dental fluorosis."

"India has lowered its guideline to 1.0 mg/lit – but we were one of the last to do so. West Africa was the first to lower theirs in 1994 to 0.5 mg/lit, and China and Thailand have followed suit in lowering theirs to 0.5 mg/lit."

"Here in India, the maximum level found so far is 48 mg/lit, and in one location in Delhi state we have detected as much as 32 mg/lit in the groundwater. Levels of 10 to 14 to 28 mg/lit are very common. We know this because patients bring us their drinking water samples."

Although the human body does excrete certain amounts of ingested fluoride through urine, faeces, milk, sweat and hair, ingesting high levels will result in the body becoming infected.

"There is no treatment for fluorosis," says Professor Susheela. "In medical science money comes from treatment and surgery and neither of them is applicable to this disease, so very few clinicians are interested because fluorosis does not fetch any money."

Luckily, money does not seem to be the cog that motivates Professor Susheela – lessening the affects of fluoride on the human race does. With so few doctors in India or the rest of the world having the knowledge of diagnosing fluorosis, Professor Susheela and her team are trying to reverse the trend.

"We are now spreading the message across the country and our first attempt has been to educate the doctors with regard to diagnosing fluorosis and patient care, so they will in turn train their students at the medical schools."

Did You Know?

How do humans ingest fluoride and develop fluorosis?

According to Professor Susheela, there are **five** major sources:

- **Drinking water**

... particularly in the developing world where it comes from underground via tube wells or bore wells.

- **Food contamination**

... items containing high amounts of fluoride includes black tea and Rock or Black salt, which contains 157 ppm (parts per million) of fluoride.

... In the Western world, it could be found in preserved food because fluoride is a preservative. It kills the bacteria and is found in many products sold in supermarkets such as fruit juice, canned fish, mineral water, red wine, beer and seafood.

- **Dental products**

... fluoridated toothpaste, children's toothpaste, mouth rinse, tablets.

... fluoridated toothpaste can contain as much as 4,000 ppm of fluoride.

... even plain toothpaste can contain 1,000 ppm of fluoride due to the raw products used.

- **Drugs**

... all antidepressants contain fluoride, and anti-cholesterol drugs are never manufactured without fluoride.

- **Industry** such as brick or aluminium production ... common causes of fluorosis include inhalation of fluoride dust or fumes. It is also present where coal is used as an indoor fuel.

Having already trained doctors and developed their diagnostic infrastructure in eight medical schools, Professor Susheela is confident that the word is spreading, slowly but surely.

For the past 17 years, the professor has been travelling once every six weeks to India's largest aluminium producer to look after the health of the employees who work in the aluminium smelter. Professor Susheela explained, "Being exposed to

► This is a safe alternate source of water, but it doesn't work due to the lack of diesel that is needed to run this water plant.

► Most of these village children suffer from various forms of fluorosis – the result of drinking water containing elevated levels of fluoride.





fluoride fumes and dust, the employees developed industrial fluorosis where their joints became stiff, unable to bend, unable to work. The company then gave them compensation and sent them away. This was very inhuman.”

“For the last 17 years we have been looking after the aluminium industry workers, 2,000 employees at one site and 750 in the other, and during all this time no man has had to be paid compensation and told to go away.

“Workers thought that the place was going to kill them. They felt they might fall down at any time and break their bones so they never went to work with joy. Not only have people’s health improved immensely, they are happy to go to work. Consequentially, their work rate has increased, which has made their company bosses very happy.”

So what was the magic formula?

“They feared the fluoride making them sick was coming from the industry. I explained the amount they were inhaling was just a small fraction. It was the fluoride in the food they were eating that was making them ill.

“With food preparation being very much a woman’s role here, we also counsel the women, telling them if they wish to keep their husbands well and happy they should not feed him all the things that contain fluoride.”

However, all this knowledge of the frightening effects of fluoride poisoning could not have prepared me for what I encountered in the rural villages in Bihar state, where fluorosis is endemic. These villages have high levels of fluoride in the groundwater system, which many people access via hand tube wells for their daily drinking water supply.

Arriving at the first village, I encountered a scene hard to forget – distorted legs, backs bent, so many people struggling to move: young and old, male and female alike. An elderly gentleman who was obviously

Did You Know?

3 DISASTROUS EFFECTS OF FLUORIDE

- It can cause dental fluorosis in children
- It can cause skeletal fluorosis affecting the bones
- It can affect all the soft tissues in the body such as the muscles, the blood vessels, stomach lining, testicles and ovaries – this is known as non-skeletal fluorosis.

suffering from skeletal fluorosis revealed, “For 30 years I drank open well water with no problems. Then when the tube well arrived I drank tube well water and that was when my problems began. That was 30 years ago.”

Now aged 60, he visibly had great difficulty walking and had severe pain in his neck.

It was not that the villagers were unaware that the groundwater they were drinking was harmful – they had no alternative.

The only substitute – a diesel-operated plant – was not functioning. “The supply is erratic. We get water for about one week then nothing for months so we have to rely on the tube well water,” said the elderly gentleman.

Local government sources indicated that this was due to having no diesel to operate the plant.

Mothers spoke of their children, “They were healthy at birth, but once they started drinking the tube well water you can see what has happened to them.”

The vision of children three or four years old with twisted, crippled limbs struggling with sticks to support themselves remains. Sadly, this village is not an isolated case; similar tales in the other villages I visited revealed more suffering from fluorosis.

Returning to New Delhi, I spoke with Dr. K. Mazundar, who is Deputy Adviser for the Government of India’s Rajiv Gandhi National Drinking Water Mission with the Ministry of Rural Development. He said, “The Indian government is working hard to provide communities with safe drinking water supplies. We recognise the problems and we are striving to address them. It is a vast country and a large population and it takes time. We are supporting those states affected and no funds are being spared to mitigate the problem.”

UNICEF reports that fluorosis is endemic in at least 25 countries across the globe. The total number of people affected is not known, but a conservative estimate would number in the tens of millions.

The WHO estimates that 2.7 million people in China are suffering from the crippling form of skeletal fluorosis. Visit fluorideandfluorosis.com to learn more and support the organisation in their fight against fluorosis. **AG**

Adrian Page is a research journalist and photographer based in Queensland, Australia. His writing and photography work takes him to a variety of locations around the world. Page also produces current affair programmes for radio broadcast shows related to environmental and humanitarian issues.

Lost cause?

According to Professor Susheela, studies indicate fluoride harms fetuses carried by pregnant women and may cause miscarriages and stillbirths.

There is now ample scientific evidence to support the fact that ingestion of fluoride prevents biosynthesis of haemoglobin, leading to anaemia in human beings. The danger of anaemia in pregnancy is that it would lead to abnormalities in the development of the embryo foetus.”

So what can we do?

Professor Susheela says it is preventable by having good dietary practices.

“It took a long time but we now know that diet is better than any medicine. It can prevent not just this disease but many other diseases including cancer.”



► Professor A K Susheela has dedicated much of her working life to understanding the crippling effects of fluorosis.

◄ Fluoride poisoning affects the young and old alike.

◄▲ Another example of how elevated levels of fluoride affects the human body.

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