WEEKLY EPIDEMIOLOGICAL REPORT

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Arsenic

Background

Arsenic is a chemical element with symbol As and its atomic number is 33. Arsenic occurs in many minerals, usually in conjunction with sulphur and metals, and as a pure elemental crystal. Arsenic is a metalloid. It can exist in various allotropes, although only the grey form has important use in industry. The main use of metallic arsenic is for strengthening alloys of copper and especially lead (for example, in car batteries).

Sources of exposure

Arsenic is a natural component of the earth's crust and is widely distributed throughout the environment in the air, water, and land. It is highly toxic in its inorganic form. People are exposed to elevated levels of inorganic arsenic through drinking contaminated water, using contaminated water in food preparation and irrigation of food crops, industrial processes, eating contaminated food and smoking tobacco. Long-term exposure to inorganic arsenic, mainly through drinking of contaminated water, eating of food prepared with this water and eating food irrigated with arsenic -rich water, can lead to chronic arsenic poisoning. Skin lesions and skin cancer are the most characteristic effects.

Drinking-water and food

The greatest threat to public health from arsenic originates from contaminated groundwater. Inorganic arsenic is naturally present at high levels in the groundwater of several countries, including Argentina, Bangladesh, Chile, China, India, Mexico, and the United States of America. Drinking-water, crops irrigated with contaminated water and food prepared with contaminated water are the sources of exposure. Fish, shellfish, meat, poultry, dairy products, and cereals can also be dietary sources of arsenic, although exposure from these foods is generally much lower compared to exposure through contaminated groundwater. In seafood, arsenic is mainly found in its less toxic organic form.

Industrial processes

Arsenic is used industrially as an alloying agent, as well as in the processing of glass, pigments, textiles, paper, metal adhesives, wood preservatives and ammunition. Arsenic is also used in the hide tanning process and, to a limited extent, in pesticides, feed additives and pharmaceuticals.

Tobacco

People who smoke tobacco can also be exposed to the natural inorganic arsenic content of tobacco because tobacco plants essentially take up arsenic naturally pre-

Contents

sent in the soil. Also, in the past, the potential for elevated arsenic exposure was much greater when tobacco plants used to be treated with lead arsenate insecticide.

Health effects

Arsenic occurs in inorganic and organic forms. Inorganic arsenic compounds (such as those found in water) are highly toxic while organic arsenic compounds (such as those found in seafood) are less harmful to health.

Acute effects

The immediate symptoms of acute arsenic poisoning include vomiting, abdominal pain, and diarrhoea. These are followed by numbness and tingling of the extremities, muscle cramps and death, in extreme cases.

Long-term effects

The first symptoms of long-term exposure to high levels of inorganic arsenic (e.g., through drinking-water and food) are usually observed in the skin, and include pigmentation changes, skin lesions and hard patches on the palms and soles of the feet (hyperkeratosis). These occur after a minimum exposure of approximately five years and may be a precursor to skin cancer. In addition to skin cancer, long-term exposure to arsenic may also cause cancers of the bladder and lungs. The International Agency for Research on Cancer (IARC) has classified arsenic and arsenic compounds as carcinogenic to humans and has also stated that arsenic in drinking-water is carcinogenic to humans. Other adverse health effects that may be associated with long-term ingestion of inorganic arsenic include developmental effects, neurotoxicity, diabetes, and cardiovascular disease. In China (Province of Taiwan), arsenic exposure has been linked to “black foot disease,” which is a severe disease of blood vessels leading to gangrene. However, this disease has not been observed in other parts of the world, and it is possible that malnutrition contributes to its development.

Magnitude of the problem

Arsenic contamination of groundwater is widespread and there are several regions where arsenic contamination of drinking-water is significant. Arsenic in Bangladesh has attracted much attention since recognition in the 1990s of its wide occurrences in well-water in that country. Since this time, significant progress has since been made and the number of people exposed to arsenic exceeding the Bangladesh drinking-water quality standard has decreased by approximately 40%. In Sri Lanka, arsenic is suspected to be a major cause for the CKD. Many studies have been done regarding the problem. Another study has suggested that the arsenic is not present naturally in the soils of the study area which was a high CKD prevalent area. The symptoms and signs caused by long-term elevated exposure to inorganic arsenic differ between individuals, population groups and geographical areas. Thus, there is no universal definition of the disease caused by arsenic. This complicates the assessment of the burden of arsenic. Similarly, there is no method to distinguish cases of cancer caused by arsenic from cancers induced by other factors. As a result, there is no reliable estimate of the magnitude of the problem worldwide.

Prevention and control

The most important action in affected communities is the prevention of further exposure to arsenic by the provision of a safe water supply for drinking, food preparation and irrigation of food crops. There are several options to reduce levels of arsenic in drinking-water. Long-term actions are also required to reduce occupational exposure from industrial processes. Education and community engagement are key factors for ensuring successful interventions. There is a need for community members to understand the risks of high arsenic exposure and the sources of arsenic exposure, including the intake of arsenic by crops (e.g., rice) from irrigation water and the intake of arsenic into food from cooking water. High-risk populations should also be monitored for early signs of arsenic poisoning – usually skin problems.

WHO response

Arsenic is one of WHO’s 10 chemicals of major public health concern. WHO’s work to reduce arsenic exposure includes setting guideline values, reviewing evidence and providing risk management recommendations. The current recommended limit of arsenic in drinking-water is 10 µg/litre.

Sources

Arsenic, available at http://www.who.int/mediacentre/ factsheets/fs372/en/

Potential link between ground water hardness, Arsenic content, and prevalence of CKDu, available at nas-srilanka.org/wpcontent/uploads/2013/01/Paranagama-edited.pdf

Compiled by

Dr. C U D Gunasekara

Table 1: Selected notifiable diseases reported by Medical Officers of Health 21st - 27th Aug 2021 (35th Week)

RDHS	Dengue Fever		Dysentery		Encephaliti		Enteric Fever		Food Poi-		Leptospirosis		Typhus		Viral Hep-		Human		Chickenpox		Meningitis		Leishmania-		WRCD	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	T*	C**
Colombo	50	3359	0	10	0	1	0	4	0	3	0	138	0	1	0	2	0	2	0	22	1	9	0	1	45	100
Gampaha	17	1726	0	1	0	4	0	1	0	0	0	160	0	5	0	4	0	5	0	19	0	12	0	12	22	75%
Kalutara	23	965	0	11	0	2	0	3	0	0	3	381	0	3	0	1	0	1	0	66	0	16	0	0	34	100
Kandy	17	530	0	18	0	1	0	2	0	2	1	100	1	30	0	1	0	0	2	32	0	14	0	21	58	100
Matale	0	151	0	12	0	4	0	0	0	0	0	64	0	5	0	1	0	0	0	12	0	5	1	177	53	100
NuwaraEliya	0	37	0	11	0	2	0	2	0	0	0	45	0	35	0	4	0	0	0	24	0	7	0	1	28	100
Galle	3	268	0	5	0	1	0	5	0	5	0	517	0	23	0	2	0	0	1	46	2	27	0	1	39	100
Hambantota	0	265	0	9	0	2	0	2	0	4	0	204	0	56	0	7	0	0	0	43	0	30	4	358	71	100
Matara	4	397	0	3	0	1	0	1	0	0	1	197	0	16	0	2	0	0	1	48	0	10	0	208	43	100
Jaffna	0	123	4	40	0	3	0	14	0	27	0	16	0	438	0	0	0	4	0	27	0	3	0	2	22	88%
Kilinochchi	1	24	0	23	0	0	0	2	0	10	1	54	1	76	0	0	0	0	0	10	0	0	0	1	51	100
Mannar	0	25	1	3	0	0	0	4	0	0	0	26	0	2	0	0	0	0	0	3	1	16	0	1	38	100
Vavuniya	0	35	0	2	0	1	0	1	0	1	0	23	0	2	0	1	0	0	0	6	0	1	0	1	38	100
Mullaitivu	0	5	0	3	0	0	0	0	0	1	0	32	0	8	0	0	0	0	0	9	0	6	0	0	21	100
Batticaloa	1	2994	0	27	1	4	0	2	0	16	0	39	0	0	0	1	0	0	0	12	0	22	0	0	46	100
Ampara	0	34	0	7	0	0	0	1	0	7	0	49	0	1	0	2	0	0	0	37	0	11	0	8	60	100
Trincomalee	0	121	0	0	0	0	0	0	0	2	0	4	0	0	0	2	0	0	0	16	0	2	0	0	27	100
Kurunegala	5	869	0	18	0	4	0	0	0	3	1	237	0	25	0	3	0	2	0	41	0	77	1	279	37	100
Puttalam	1	283	0	2	0	1	0	0	0	0	0	22	0	15	0	1	0	1	0	16	0	32	0	9	41	98%
Anuradhapur	1	179	0	10	0	0	0	1	0	3	1	219	0	23	0	4	0	0	2	31	0	31	1	183	25	91%
Polonnaruwa	0	62	0	3	0	0	0	3	0	8	1	106	0	3	0	3	0	0	0	26	0	2	0	333	39	100
Badulla	0	189	0	9	0	0	0	1	0	0	1	270	0	39	1	31	0	0	1	33	0	14	0	16	43	100
Monaragala	1	102	0	6	0	0	0	3	0	5	1	308	0	28	0	67	0	0	0	24	0	49	1	28	50	100
Ratnapura	1	412	0	26	0	6	0	0	0	5	2	602	0	18	0	8	0	1	0	44	2	66	0	92	34	95%
Kegalle	3	359	0	4	0	11	0	0	0	2	0	218	0	11	0	1	0	0	0	79	0	24	0	14	40	100
Kalmune	2	269	1	12	0	2	0	1	0	1	0	16	0	1	0	2	0	2	0	14	1	9	0	2	46	100
SRILANKA	13	13783	6	275	1	50	0	53	0	105	13	4047	2	864	1	150	0	18	7	740	**7**	**495**	8	1748	41	97%

Source: Weekly Returns of Communicable Diseases (esurvillance.epid.gov.lk). T=Timeliness refers to returns received on or before 27th Aug , 2021 Total number of reporting units 361 Number of reporting units data provided for the current week: 351 C**-Completeness

Table 2: Vaccine-Preventable Diseases & AFP

21st – 27th Aug 2021 (35th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2021	Number of cases during same week in 2020	Total number of cases to date in 2021	Total number of cases to date in 2020	Difference between the number of cases to date in 2021& 2020
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	01	00	00	00	00	00	00	01	01	39	30	30 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Mumps	00	00	00	00	00	00	00	00	00	00	01	57	123	- 53.6 %
Measles	00	00	00	00	00	00	00	00	00	00	00	11	37	- 70.2 %
Rubella	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
CRS**	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Tetanus	00	00	00	00	00	00	00	00	00	00	00	02	03	- 33.33%
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	03	31	- 90.3 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	02	00	07	- 100%
Tuberculosis	00	00	00	00	00	00	00	00	00	00	167	3429	4191	- 18.1 %

Key to Table 1 & 2

Provinces: **W**: Western, **C**: Central, **S**: Southern, **N**: North, **E**: East, **NC**: North Central, **NW**: North Western, **U**: Uva, **Sab**: Sabaragamuwa.

RDHS Divisions: **CB**: Colombo, **GM**: Gampaha, **KL**: Kalutara, **KD**: Kandy, **ML**: Matale, **NE**: Nuwara Eliya, **GL**: Galle, **HB**: Hambantota, **MT**: Matara, **JF**: Jaffna, **KN**: Killinochchi, **MN**: Mannar, **VA**: Vavuniya, **MU**: Mullaitivu, **BT**: Batticaloa, **AM**: Ampara, **TR**: Trincomalee, **KM**: Kalmunai, **KR**: Kurunegala, **PU**: Puttalam, **AP**: Anuradhapura, **PO**: Polonnaruwa, **BD**: Badulla, **MO**: Moneragala, **RP**: Ratnapura, **KG**: Kegalle.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Neonatal Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps., Rubella, CRS,

Special Surveillance: AFP* (Acute Flaccid Paralysis), Japanese Encephalitis

CRS =**Congenital Rubella Syndrome

NA = Not Available

Covid-19 Prevention & Control

For everyone's health & safety, maintain physical distance, often wash hands, wear a face mask and stay home.

Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to **chepid@sltnet.lk. Prior approval should be obtained from the Epidemiology Unit before publishing data in this publication**

ON STATE SERVICE

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