



WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit
Ministry of Health

231, de Saram Place, Colombo 01000, Sri Lanka
Tele: + 94 11 2695112, Fax: +94 11 2696583, E mail: epidunit@slt.net.lk
Epidemiologist: +94 11 2681548, E mail: chepid@slt.net.lk
Web: <http://www.epid.gov.lk>

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Arsenic

Background

Arsenic is a chemical element with symbol **As** and atomic number 33. Arsenic occurs in many minerals, usually in conjunction with sulfur and metals, and also as a pure elemental crystal. Arsenic is a metalloid. It can exist in various allotropes, although only the gray 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 a number of 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 present 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

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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 “blackfoot 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 a number of regions where arsenic contamination of drinking-water is significant.

Arsenic in Bangladesh has attracted much attention since recognition in the 1990s of its wide occurrence 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 a number of 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/wp-content/uploads/2013/01/Paranagama-edited.pdf

Compiled by Dr. C U D Gunasekara of the Epidemiology Unit

Table 1: Selected notifiable diseases reported by Medical Officers of Health 18th - 24th April 2015 (17th Week)

RDHS Division	Dengue Fever		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Chickenpox		Meningitis		Leishmaniasis		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	99	3724	5	72	0	4	1	28	2	50	7	97	1	4	1	16	0	3	6	187	1	15	0	0	81	19
Gampaha	30	1705	0	24	0	3	1	9	0	10	5	171	0	6	3	70	0	0	7	71	1	9	0	0	60	40
Kalutara	19	625	2	36	0	4	1	15	0	65	4	116	0	0	1	14	0	1	12	117	3	17	0	0	77	23
Kandy	6	546	0	46	1	5	1	14	0	17	0	25	1	27	0	68	0	0	1	91	1	5	0	1	65	35
Matale	3	297	0	21	0	0	0	4	0	3	0	20	0	4	0	18	0	0	0	7	0	3	0	3	38	62
NuwaraEliya	3	79	12	110	0	1	0	9	0	0	0	10	0	29	1	37	0	0	2	27	3	24	0	0	69	31
Galle	0	283	0	24	0	0	0	2	0	6	0	55	0	22	0	4	0	0	0	60	0	13	0	0	0	100
Hambantota	2	141	0	11	0	0	0	4	1	5	2	34	1	19	0	17	0	0	6	47	0	4	11	102	75	25
Matara	4	196	1	28	0	3	0	4	0	44	2	75	0	17	3	14	0	0	5	94	0	9	2	24	100	0
Jaffna	9	992	12	239	0	8	2	128	5	33	0	10	9	473	0	7	0	1	10	91	0	6	0	0	100	0
Kilinochchi	0	32	1	36	0	0	0	4	1	26	0	1	0	9	0	0	0	0	0	10	0	0	0	0	50	50
Mannar	1	69	0	4	1	1	1	5	0	1	0	8	0	15	0	0	0	0	0	2	0	0	0	0	100	0
Vavuniya	1	58	0	10	0	4	2	27	0	3	0	10	0	11	0	1	0	2	0	32	0	3	1	2	50	50
Mullaitivu	0	67	0	10	0	2	0	4	0	1	0	3	0	6	0	2	0	0	0	1	0	2	0	3	60	40
Batticaloa	25	985	1	108	0	4	1	11	2	99	0	2	0	0	0	0	0	0	3	18	0	10	0	0	57	43
Ampara	0	20	0	18	0	0	0	1	0	2	0	6	0	0	0	2	0	0	4	89	0	3	0	0	57	43
Trincomalee	16	359	1	18	0	0	2	17	2	25	0	11	1	4	0	6	0	1	1	33	0	2	0	1	83	17
Kurunegala	25	674	3	64	0	2	0	3	2	12	6	101	1	14	1	16	0	1	12	173	2	9	1	33	89	11
Puttalam	2	382	1	14	0	2	1	2	0	6	0	17	0	7	0	1	0	0	0	28	1	10	0	1	62	38
Anuradhapura	2	241	0	24	0	1	0	2	0	48	4	119	1	15	0	8	0	0	5	82	0	12	10	95	74	26
Polonnaruwa	3	114	2	24	0	2	0	6	0	0	1	41	0	1	0	3	0	0	11	62	0	12	1	43	57	43
Badulla	13	311	3	52	0	3	0	3	0	6	2	25	3	40	8	63	0	2	3	53	4	27	0	6	71	29
Monaragala	2	94	1	41	0	1	1	9	0	2	13	109	0	29	3	29	0	1	3	36	0	5	1	11	64	36
Ratnapura	15	417	4	109	0	3	1	22	0	1	11	130	1	25	1	120	0	0	5	46	4	16	0	4	72	28
Kegalle	8	229	0	30	0	7	1	35	0	3	8	102	0	22	1	48	0	0	6	85	1	20	0	0	64	36
Kalmune	4	353	4	48	0	0	0	1	3	26	0	2	0	0	0	0	0	0	0	52	0	4	0	0	38	62
SRILANKA	292	12993	53	1221	2	60	16	369	18	494	65	1300	19	799	23	564	0	13	102	1594	21	240	27	329	67	33

Source: Weekly Returns of Communicable Diseases (WRCD).

*T=Timeliness refers to returns received on or before 24th April, 2015 Total number of reporting units 337 Number of reporting units data provided for the current week 227 C**=Completeness

Table 2: Vaccine-Preventable Diseases & AFP

18th - 24th April 2015 (17th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2015	Number of cases during same week in 2014	Total number of cases to date in 2015	Total number of cases to date in 2014	Difference between the number of cases to date in 2014 & 2015
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	00	00	00	00	00	00	00	00	00	03	22	29	-24.1%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	%
Mumps	01	00	00	00	00	00	00	00	02	03	10	123	252	-51.2%
Measles	25	02	09	01	01	12	04	01	10	65	77	725	1527	52.5%
Rubella	00	00	00	00	00	00	00	00	00	00	00	05	08	-37.5%
CRS**	00	00	00	00	00	00	00	00	00	00	00	00	03	%
Tetanus	00	00	00	00	00	00	00	00	00	00	01	04	07	-43.1%
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	07	17	-59.1%
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	02	30	21	+43.1%
Tuberculosis	176	76	23	26	16	45	11	12	00	385	170	3201	3322	-3.7%

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

AFP and all clinically confirmed Vaccine Preventable Diseases except Tuberculosis and Mumps should be investigated by the MOH

Dengue Prevention and Control Health Messages

Look for plants such as bamboo, bohemia, rampe and banana in your surroundings and maintain them

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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

Dr. P. PALIHAWADANA
 CHIEF EPIDEMIOLOGIST
 EPIDEMIOLOGY UNIT
 231, DE SARAM PLACE
 COLOMBO 10