WEEKLY EPIDEMIOLOGICAL REPORT

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Ministry of Health

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Yellow Fever-Are we at risk?

Yellow fever (YF) is a mosquito-borne, viral haemorrhagic fever that is endemic in tropical regions of Africa and South America. The "yellow" in the name refers to the jaundice that affects some patients. There are an estimated 200 000 cases of yellow fever, causing 30 000 deaths, worldwide each year. Up to 50% of severely affected persons without treatment will die from yellow fever.

About 90% of annual cases of YF occur in Africa, where outbreaks are common and where both the urban and the jungle type of transmissions occur. In South America, the jungle type of YF predominates, either in individual cases or localized outbreaks.

The number of yellow fever cases has increased over the past two decades due to declining population immunity to infection, deforestation, urbanization, population movements and climate change. There is no cure for yellow fever. Treatment is symptomatic, aimed at reducing the symptoms for the comfort of the patient.

The pathogen

The yellow fever virus is an arbovirus of the genus Flavivirus, which comprises about 70 different viruses, most of which are arthropod-borne. Based on sequence analysis, wild-type YF virus strains have been classified into at least seven genotypes: five in Africa and two in South America. The genotypic variation is not accompanied by antigenic differences across strains and vaccine is therefore effective against all YF virus genotypes in both continents.

Following a bite from an infected mosquito, YF virus first replicates at the site of inoculation and spreads from there to the local lymph nodes, liver, spleen, bone marrow and myocardium, but very rarely to the brain (i.e. viscerotropic rather than neurotropic). The virus is present in blood during the incubation period and early stage of illness at levels capable of infecting blood-feeding *Aedes aegypti.*

Populations at risk

Forty-five endemic countries in Africa and Latin America with a combined population of over 900 million are at risk. In Africa, an estimated 508 million people living in 32 countries are at risk. The remaining population at risk are in 13 countries in Latin America with Bolivia, Brazil, Colombia, Ecuador and Peru at greatest risk.

Transmission

Mosquito is the primary vector of the disease. It carries the virus from one host to another, primarily between monkeys, from monkeys to humans and from person to person.

Several different species of the *Aedes* and *Haemogogus* mosquitoes transmit the virus. The mosquitoes either breed around houses (domestic), in the jungle (wild) or in both habitats (semi-domestic). There are three types of transmission cycles.

Sylvatic (jungle) yellow fever

In tropical rainforests, yellow fever occurs in monkeys that are infected by wild mosquitoes. The infected monkeys then pass the virus to other mosquitoes that feed on them. The infected mosquitoes bite humans entering the forest, resulting in occasional cases of yellow fever. The majority of infections occur in young men working in the forest (e.g. loggers).

Intermediate yellow fever

In humid or semi-humid parts of Africa, small-scale epidemics occur. Semi-domestic mosquitoes (that breed in the wild and around households) infect both monkeys and humans. Increased contact between people and infected mosquitoes leads to transmission. Many separate villages in an area can suffer cases simultaneously. This is the most common type of outbreak in Africa. An outbreak can become a more severe epidemic if the infection is carried into an area populated with both domestic mosquitoes and unvaccinated people.

Urban yellow fever

Large epidemics occur when infected people introduce the virus into densely populated areas with a high number of non-immune people and *Aedes* mosquitoes. Infected mosquitoes transmit the virus from person to person.

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Signs and symptoms

Once contracted, the virus incubates in the body for 3 to 6 days, followed by infection that can occur in one or two phases. The first, "acute" phase usually causes fever, muscle pain with prominent backache, headache, shivers, loss of appetite and nausea or vomiting. Most patients improve and their symptoms disappear after 3 to 4 days.

However, 15% of patients enter a second, more toxic phase within 24 hours of the initial remission. High fever returns and several systems of the body are affected. The patient rapidly develops jaundice and complains of abdominal pain with vomiting. Bleeding can occur from the mouth, nose, eyes or stomach. Once this happens, blood appears in the vomitus and faeces. Kidney function deteriorates. Half of the patients who enter the toxic phase die within 10 to 14 days, the rest recover without significant organ damage.

Diagnosis

Yellow fever is difficult to diagnose, especially during the early stages. It can be confused with severe malaria, dengue hemorrhagic fever, leptospirosis, viral hepatitis (especially the fulminating forms of hepatitis B and D), other hemorrhagic fevers (Bolivian, Argentine, Venezuelan hemorrhagic fevers and others flavivirus such as West Nile, Zika virus etc) and other diseases as well as poisoning.

No commercial test is available for the laboratory diagnosis of YF, but specialized laboratories perform IgM assay for Yellow Fever. As cross-reactions occur between the YF virus and other flaviviruses, it is recommended that all presumptive positive cases are confirmed by further tests, including testing with potentially cross-reacting antigens, virus isolation and polymerase chain reaction (PCR).

Treatment

There is no specific treatment for yellow fever, only supportive care to treat dehydration and fever. Associated bacterial infections can be treated with antibiotics. Supportive care may improve outcomes for seriously ill patients, but it is rarely available in poorer areas.

Prevention

1. Vaccination

Vaccination is the single most important measure for preventing yellow fever. In high risk areas where vaccination coverage is low, prompt recognition and control of outbreaks through immunization is critical to prevent epidemics. To prevent outbreaks throughout affected regions, vaccination coverage must reach at least 60% to 80% of population at risk. Few endemic countries that recently benefited from a preventive mass vaccination campaign in Africa currently have this level of coverage. Preventive vaccination can be offered through routine infant immunization and one-time mass campaigns to increase vaccination coverage in countries at risk, as well as for travellers to yellow fever endemic areas.

The yellow fever vaccine is safe and affordable, providing effective immunity against yellow fever within one week for 95% of those vaccinated. A single dose provides protection for 30–35 years or more, and probably for life. Serious side effects are extremely rare. Serious adverse events have been reported rarely following immunization in a few endemic areas and among vaccinated travellers (e.g. in Brazil, Australia, the United States, Peru and Togo.

People who should not be vaccinated include:

- Children aged less than 9 months for routine immunization (or less than 6 months during an epidemic)
- Pregnant women – **except** during a yellow fever outbreak when the risk of infection is high
- People with severe allergies to egg protein
- People with severe immunodeficiency due to symptomatic HIV/AIDS or other causes, or in the presence of a thymus disorder.

If there are medical grounds for not getting vaccinated, International Health Regulations state that this must be certified by the appropriate authorities.

2. Mosquito control

In some situations, mosquito control is vital until vaccination takes effect. The risk of yellow fever transmission in urban areas can be reduced by eliminating potential mosquito breeding sites and applying insecticides/releasing larvivorous fish to water. Application of spray insecticides to kill adult mosquitoes during urban epidemics, combined with emergency vaccination campaigns, can reduce or halt yellow fever transmission, "buying time" for vaccinated populations to build immunity.

3. Epidemic preparedness and response

Prompt detection of yellow fever and rapid response through emergency vaccination campaigns are essential for controlling outbreaks. However, underreporting is a concern – the true number of cases is estimated to be 10 to 250 times of what is now being reported.

Sri Lanka has the potential for spreading Yellow Fever as *Aedes aegypti* mosquito is found in Sri Lanka. Therefore, travellers above one year of age arriving in Sri Lanka from countries in Africa or Latin America with Yellow Fever transmission [e.g. Angola, Argentina, Benin, Bolivia (Plurinational State of), Brazil, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Colombia, Congo, Côte d'Ivoire, Democratic Republic of the Congo , Ecuador, Equatorial Guinea, Ethiopia, French Guiana, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Guyana, Kenya, Liberia, Mali, Mauritania, Niger, Nigeria, Panama, Paraguay, Peru, Rwanda, Senegal, Sierra Leone, Sudan, Suriname, Togo, Trinidad and Tobago, Uganda, Venezuela (Bolivarian Republic of)] must have a valid certificate of yellow fever vaccination. Therefore, Sri Lankans who are visiting above mentioned countries should receive Yellow Fever vaccine before they embark on their journeys for their own safety, and to facilitate unhindered entry to Sri Lanka on their return.

Valid certificate of yellow fever vaccination-The traveller concerned has received vaccine at least 10 days prior to arrival in Sri Lanka. Yellow fever vaccine should be administered every 10 years for the vaccination certificate to be valid, even though it is believed to offer protection against Yellow Fever for 30–35 years or more. In case of a revaccination, the certificate of vaccine is valid from the date of issue .

Travellers who possess an exemption from yellow fever vaccination, signed by an authorized medical officer or an authorized health worker, may nevertheless be allowed entry.

If a traveller from an area with Yellow Fever is not in the position of a valid certification of vaccination against yellow fever, he or she can be quarantined until the certificate becomes valid, or until a period of not more than six days, reckoned from the date of last possible exposure to infection, has elapsed.

This vaccine is available in Port Health offices at Port of Colombo and Medical Research Institute (MRI)

Sources

WHO fact sheet on Yellow fever-available from
http://www.who.int/mediacentre/factsheets/fs100/en/
International Health Regulations (WHO)-available from
whqlibdoc.who.int/publications/2008/9789241580410_eng.pdf

Compiled by Dr. Madhava Gunasekera of the Epidemiology Unit

Table 1: Vaccine-preventable Diseases & AFP

18th – 24th February 2012 (08th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2012	Number of cases during same week in 2011	Total number of cases to date in 2012	Total number of cases to date in 2011	Difference between the number of cases to date in 2012 & 2011
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	00	01	00	00	00	00	00	00	01	02	12	17	- 29.4 %
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	00	00	00	00	00	01	01	00	00	02	01	08	13	- 38.4 %
Tetanus	00	00	00	00	00	00	00	00	00	00	05	02	04	100.0 %
Whooping Cough	00	01	02	00	00	00	00	00	00	03	00	15	06	+150.0 %
Tuberculosis	27	13	00	18	00	00	10	03	25	96	229	1391	1340	+ 03.8 %

Table 2: Newly Introduced Notifiable Disease

18th – 24th February 2012 (08th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2012	Number of cases during same week in 2011	Total number of cases to date in 2012	Total number of cases to date in 2011	Difference between the number of cases to date in 2012 & 2011
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	14	04	16	02	15	12	03	10	09	85	90	781	744	+ 04.9 %
Meningitis	00	01 KD=1	00	01 VU=1	00	01 KN=1	00	00	02 RP=2	05	26	123	161	- 23.6 %
Mumps	11	04	05	02	23	04	04	06	06	16	32	642	319	+ 101.2 %
Leishmaniasis	00	00	08 MT=2 HB=6	00	00	03 KN=3	06 PL=6	00	00	17	12	149	98	+ 52.0 %

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.

DPDHS 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, Whooping Cough, Chickenpox, Meningitis, Mumps.

Special Surveillance: Acute Flaccid Paralysis.

Leishmaniasis is notifiable only after the General Circular No: 02/102/2008 issued on 23 September 2008. .

Dengue Prevention and Control Health Messages

Check the roof gutters regularly for water collection where dengue mosquitoes could breed .

Table 4: Selected notifiable diseases reported by Medical Officers of Health

18th – 24th February 2012 (08th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	94	1726	2	22	0	4	6	43	0	4	0	14	0	0	0	14	0	1	**69**
Gampaha	58	1366	3	19	0	0	1	15	0	0	1	28	1	4	1	51	0	1	**67**
Kalutara	62	435	2	20	1	2	2	11	0	3	5	33	0	1	2	6	0	0	**85**
Kandy	41	455	0	14	0	0	1	6	0	4	1	18	4	36	0	2	0	0	**96**
Matale	6	89	0	22	0	2	0	6	0	3	0	9	1	2	0	5	0	0	**92**
Nuwara	14	56	4	17	0	1	0	6	0	0	0	4	0	14	0	6	0	0	**77**
Galle	16	205	0	21	0	1	0	5	0	4	1	17	0	8	0	1	0	0	**84**
Hambantota	14	112	0	9	0	0	0	1	0	4	1	15	2	17	0	3	0	0	**67**
Matara	34	333	2	13	0	3	0	7	3	7	5	22	3	21	5	40	0	0	**100**
Jaffna	5	131	7	42	0	3	9	117	0	8	0	2	11	204	0	2	0	0	**92**
Kilinochchi	0	9	0	5	0	0	0	9	0	39	0	2	0	16	0	1	0	1	**50**
Mannar	3	54	2	7	0	1	0	6	0	8	2	8	0	18	0	1	0	0	**100**
Vavuniya	0	18	0	2	0	11	0	2	0	3	0	14	0	0	0	1	0	0	**100**
Mullaitivu	0	3	0	3	0	1	1	3	0	1	0	2	0	4	0	0	0	0	**100**
Batticaloa	18	375	6	30	0	0	0	5	0	2	2	4	0	0	0	3	1	1	**79**
Ampara	1	24	3	26	0	0	0	2	0	0	1	9	0	0	0	1	0	0	**86**
Trincomalee	4	42	2	30	0	1	0	7	0	1	0	10	0	0	0	1	0	0	**58**
Kurunegala	16	293	1	24	0	4	1	26	0	6	5	37	1	13	0	12	0	1	**78**
Puttalam	6	207	1	19	0	2	0	2	0	1	0	9	0	6	0	0	0	0	**42**
Anuradhapu	3	72	0	16	0	0	0	1	0	1	0	28	1	8	3	15	0	0	**63**
Polonnaruw	1	50	0	10	0	0	0	0	0	0	2	10	0	1	1	5	0	1	**43**
Badulla	1	59	5	21	0	2	1	7	0	0	0	8	2	7	0	8	0	0	**65**
Monaragala	4	38	3	13	0	1	0	6	0	0	1	20	7	22	4	15	0	0	**91**
Ratnapura	22	259	3	54	0	15	0	10	0	2	3	77	0	6	3	32	0	0	**67**
Kegalle	22	285	0	16	1	2	1	9	0	5	3	20	0	9	12	111	0	0	**73**
Kalmune	8	84	7	55	0	0	0	4	0	4	0	1	0	0	0	1	0	1	**92**
SRI LANKA	**453**	**6780**	**53**	**530**	**02**	**56**	**23**	**316**	**03**	**113**	**33**	**421**	**33**	**417**	**31**	**337**	**01**	**07**	**77**

Source: Weekly Returns of Communicable Diseases WRCD).
***Dengue Fever / DHF** refers to Dengue Fever / Dengue Haemorrhagic Fever.
****Timely** refers to returns received on or before 24th February, 2012 Total number of reporting units 329. Number of reporting units data provided for the current week: 255
A = Cases reported during the current week. **B** = Cumulative cases for the year.

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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.**

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