



WEEKLY EPIDEMIOLOGICAL REPORT

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Dengue control in Sri Lanka : a snap shot

Four experts have been following the articles in Sri Lankan newspapers about the current dengue epidemic and efforts to control it. In this issue, we focus on their review on recent and past studies on the dengue situation in the country and discuss the practicalities of protecting people from dengue.

Dengue Viruses and Disease

Dengue is caused by 4 closely related viruses transmitted by *Aedes aegypti* mosquitoes. These viruses are widespread and found in almost all tropical parts of the world, where they mainly thrive in urban areas. Many people infected with dengue virus develop no symptoms at all. Others develop dengue fever, which is a "flu-like" illness that is not life threatening. A minority of infected people develop a severe life threatening form of the disease known as dengue haemorrhagic fever (DHF). Typically less than five percent of people infected with dengue viruses develop DHF. Although scientists are still far from understanding why only some dengue infections lead to haemorrhagic disease, it is clear that factors such as age of the person and previous exposure to dengue infections increase the risk of severe disease. It is also clear that all dengue viruses are not identical, and some variants of the virus are more likely to cause severe disease than others. Therefore, the unfortunate few who develop DHF happen to be especially susceptible to the disease and/or infected with a more harmful variant of the virus.

Dengue in Sri Lanka

Dengue viruses are transmitted throughout the year in many parts of the Island, with greater intensity in more urban, densely populated cities. In some years an increase in the number of cases has been observed in the middle of the year (May-July) with the south-western monsoon rains and towards the end of the year (October-January) with the north-eastern monsoon rains. Studies carried out by the Medical Research Institute (MRI), Colombo have demonstrated the presence of dengue virus in Colombo

as far back as the 1960s. However, DHF was a rare disease in Sri Lanka in the period from 1960-1988. After 1989 clinicians started to observe more cases of DHF. Initially, most of the cases were reported from Colombo and other parts of the south western coastal belt. After the year 2000 the magnitude of dengue epidemics increased and the virus started to spread to other parts of the country as well. DHF cases are reported from almost all districts in the Island. The year 2004 was one of the worst years on record with over 15000 cases of dengue reported in the country. So far it looks like 2009 is another bad year with over 9000 cases being reported during the first 6 months of the year alone. Thus, the current DHF epidemic is the continuation of a worsening, long term trend that began in 1989.

Authors have studied dengue viruses to understand this long term shift in dengue disease severity in Sri Lanka. We have discovered that even before severe dengue disease emerged in 1989, the viruses were very common in Colombo as 50% of 5-7 year old children had been infected with the virus. Authors still do not have a satisfactory explanation as to how DHF suddenly appeared in Sri Lanka. The leading theory is one that was originally proposed in the 1990s by Professor Tissa Vitarana at the MRI and Dr. Duane Gubler at the CDC, USA. They suggested that mild dengue virus strains native to Sri Lanka have been replaced by new strains introduced from outside the country capable of causing severe disease. In fact genetic studies recently published by the group of these authors have demonstrated that new strains of dengue, most likely to have been introduced from outside, have replaced native strains. However, so far the authors of this article have not been able to definitively establish or prove the reasons for the emergence of severe disease in Sri Lanka. The idea that new strains might be responsible is only a hypothesis and not a fact.

Dengue Control in Sri Lanka

Sri Lankan newspapers are also full of columns

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trying to assign blame to someone or group for the current epidemic. The public at large think the culprit is garbage and they blame the local authorities for not being responsible for cleaning the cities. On the other hand the government officials think that the public is to blame for creating mosquito breeding sites in and around their homes. Dengue has also become a political issue with the opposition blaming the government for not doing enough to control the epidemic. The reality is that mosquito breeding sites created by people do make the situation worse but there are many other environmental and ecological factors beyond our control that also have a strong influence on dengue epidemics. Most countries with established dengue transmission experience major epidemics approximately every 4 years and we do not understand why this is so.

There are no simple answers when it comes to controlling dengue. One approach to controlling dengue would be to reduce the number of mosquitoes capable of transmitting the virus. However, this is easier said than done. The adult dengue mosquito mostly lives indoors and lays its eggs in a variety of water holding containers commonly found inside and around houses. Large scale outdoor spraying of insecticide is of limited use because the chemicals do not reach the adult mosquitoes inside homes. To systematically eliminate the majority of these breeding sites requires a sustained, long term effort with the active participation of the government, local authorities and the community. This is a labour intensive and expensive task. Of more than 50 countries with dengue as a serious public health problem, only two (Cuba and Singapore) have succeeded in controlling dengue by reducing mosquitoes. Even in these two countries, the mosquito has not been completely eliminated, and dengue epidemics have returned in recent years.

Educating the Public about the Dangers of Dengue Haemorrhagic Fever

Currently there are no drugs or vaccines against dengue. This does not mean that the public is completely at the mercy of the virus. Most patients who develop DHF recover if they receive timely and appropriate proper, supportive medical care to maintain their blood pressure. Many deaths caused by DHF are due to patients not seeking medical care during early stages of the disease or because healthcare provider missed the warning signs of the severe disease. A major component of any public health campaign against dengue should include educating people about the warning signs of DHF and encouraging them to seek medical care early when supportive therapy is effective. The education campaign should also be directed towards newly trained doctors, especially those doctors in areas where DHF has recently emerged in Sri Lanka. DHF patients who receive proper supportive treatment at early stages of the disease almost always make a complete recovery. In our opinion most major hospitals in areas where dengue has been endemic for many years do an excellent job of diagnosing and managing severe dengue patients. The same level of excellence needs to be established in other areas, especially those areas where DHF is newly emerging.

The Warning Signs of Dengue Haemorrhagic Fever

Any child or adult who develops sudden high fever, accompanied by headache, pain when moving eyes, body aches, joint aches, redness of skin, especially on the palms, soles and around the neck, with or without vomiting may be suffering from a dengue infection. This could progress to the more severe stage of dengue where the patients might experience abdominal pain, black or red stool, persistent vomiting, with

coffee ground or red colored vomitus, any other bleeding tendency, cold extremities, restlessness or drowsiness. In deciding whether to seek medical care, patients or their families should have a high suspicion index and visit a physician even if only a few of the above symptoms are present. If the doctor suspects dengue, then a simple blood test should be done, preferably on the third day of the illness, to measure platelets and packed cell volume (concentration of blood). It is helpful to distinguish mild from severe cases. Patients with signs of severe dengue may need to be hospitalized and given supportive therapy. If the physician suspects a dengue infection with no evidence of severe disease, the patient should be asked to recover at home. However, they should be educated about the warning signs of severe disease and asked to return a day or two later for a repeat blood test to confirm that the disease is not progressing towards DHF.

Dengue Diagnostic Tests

Many clinics and hospitals in Sri Lanka, especially in the private sector, have started to offer dengue diagnostic tests that detect IgM and IgG antibodies against the virus. At early stages of a dengue infection, antibody tests are often negative because antibodies take time to develop. Furthermore, positive antibody does not mean that a patient has a current dengue infection; it could simply mean that the patient was exposed to the virus sometime in the past. These tests can be used to confirm a clinical diagnosis of dengue and to strengthen surveillance data if careful attention is paid to the timing of sample collection and the results are interpreted by an investigator who is knowledgeable about the human immune response to dengue. In most cases, IgM and IgG tests should not be used for making treatment decisions about acutely ill patients. The Dengue Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) test is also being offered by hospitals and private laboratories. While the test is specific in detecting viral RNA, it is only useful during the first few days (1-5 days) of fever when virus is present in serum. Given the cost of this assay, most people are unable to afford the test. The most important tests to perform on suspected dengue cases are hematological tests to determine if the patient is developing vascular leakage (decreased platelets and increased hematocrit), indicative of progression to DHF.

In summary, authors wish to emphasize that it is not feasible to eradicate dengue from Sri Lanka anytime in the near future. A well organized vector control program can reduce the number of infections but dengue is going to continue to be a problem for sometime. In addition to focusing on mosquito control, dengue prevention efforts should also emphasize accurate, early detection and treatment of DHF cases. Educating the public about signs of dengue infection and young doctors about the proper diagnosis and management of DHF are effective ways to reduce deaths due to dengue. One of the long term solutions to dengue will be a vaccine. There are several vaccines under development or in clinical trials. We are likely to have a vaccine within the next 10 years. The Pediatric Dengue Vaccine Initiative based in South Korea is currently supporting research and other activities needed to accelerate the development of a dengue vaccine for use in countries like Sri Lanka.

This article was authored by Dr. Aravinda de Silva of the University of North Carolina School of Medicine, Chapel Hill, USA, Dr. Hasitha Tissera, consultant Epidemiologist of the Epidemiology Unit and Dr. Sunethra Gunasena, consultant virologist of the Medical Research Institute and Dr. Dharshan De Silva, director, Genetech research institute, Colombo.

Table 1: Vaccine-preventable Diseases & AFP

17th - 23rd May 2009 (21st Week)

Disease	No. of Cases by Province									Number of cases during current week in 2009	Number of cases during same week in 2008	Total number of cases to date in 2009	Total number of cases to date in 2008	Difference between the number of cases to date in 2009 & 2008
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	01 KN=1	01 HB=1	00	00	00	00	00	00	02	05	29	41	-29.3%
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	00	00	00	03	00	00	00	00	00	03	03	58	53	+09.4%
Tetanus	00	00	00	0	00	00	01 AP=1	00	00	01	01	12	15	-20.0%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	25	15	+66.6%
Tuberculosis	43	05	10	00	19	11	04	06	20	118	71	3608	3531	+02.2%

Table 2: Newly Introduced Notifiable Disease

17th - 23rd May 2009 (21st Week)

Disease	No. of Cases by Province									Number of cases during current week in 2009	Number of cases during same week in 2008	Total number of cases to date in 2009	Total number of cases to date in 2008	Difference between the number of cases to date in 2009 & 2008
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	14	10	08	397	07	05	14	14	14	483	55	8444	2468	+242.1%
Meningitis	04 CB=2 KL=2	01 KN=1	00	00	00	02 PU=1	02 AP=2	01 BD=1	04 KG=3 KG=1	14	09	416	658	-36.8%
Mumps	02	00	02	00	03	00	04	03	02	16	37	765	1037	-26.2%
Leishmaniasis	00	00	01 HB=1	00	00	00	03 AP=3	00	00	04	Not available*	399	Not available*	-

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.

Table 3: Laboratory Surveillance of Dengue Fever

17th - 23rd May 2009 (21st Week)

Samples	Number tested	Number positive	Serotypes *				
			D1	D2	D3	D4	Negative
Number for current week	03	01	01	00	00	00	00
Total number to date in 2009	53	10	03	03	04	00	00

Sources: Genetic Laboratory, Asiri Surgical Hospital

* Not all positives are subjected to serotyping.
 NA= Not Available.

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

17th - 23rd May 2009 (21st Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Colombo	88	1084	3	77	0	5	3	81	0	31	3	219	0	4	0	30	0	3	100
Gampaha	128	680	2	70	0	10	0	22	0	9	7	122	0	3	0	31	0	2	71
Kalutara	27	282	6	121	1	4	3	32	0	11	5	92	1	1	0	7	0	2	75
Kandy	90	1004	6	157	0	3	0	16	0	52	3	96	5	70	1	21	0	0	84
Matale	17	290	0	46	0	2	0	16	0	5	1	200	0	2	0	6	0	2	83
Nuwara Eliya	9	46	9	196	0	0	4	87	0	28	0	20	0	30	1	28	0	0	100
Galle	8	67	4	82	1	8	0	1	0	12	6	83	0	2	0	6	0	3	84
Hambantota	40	318	7	39	0	6	0	3	0	5	3	41	0	34	0	8	0	0	100
Matara	38	307	2	143	0	2	0	4	1	15	0	75	0	63	2	10	0	0	100
Jaffna	0	8	3	56	0	3	5	95	0	26	0	0	2	110	6	29	0	2	50
Kilinochchi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mannar	0	4	2	30	0	1	0	56	0	4	0	0	0	0	1	23	0	1	50
Vavuniya	2	6	29	499	0	2	0	21	0	2	0	2	0	0	242	713	0	0	50
Mullaitivu	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Batticaloa	8	291	20	131	0	10	0	5	0	39	0	7	0	1	0	5	0	1	91
Ampara	4	47	2	27	0	0	0	5	0	4	0	7	0	0	0	4	0	0	57
Trincomalee	3	163	0	42	0	0	0	3	0	0	0	5	1	6	0	5	0	1	60
Kurunegala	108	527	4	74	0	5	3	30	3	4	2	48	0	43	0	31	0	4	84
Puttalam	9	100	2	56	1	7	1	45	0	0	00	42	1	25	0	6	0	1	89
Anuradhapura	13	220	14	47	0	3	0	3	0	2	0	67	0	26	0	9	0	1	74
Polonnaruwa	5	40	2	16	0	2	0	13	0	6	0	40	0	0	0	4	0	0	100
Badulla	9	50	3	111	0	2	1	22	0	18	2	38	3	40	2	97	0	1	73
Monaragala	2	20	1	23	0	0	0	9	0	7	0	10	0	36	0	23	0	1	91
Ratnapura	83	289	11	272	0	15	1	30	0	4	7	61	0	17	0	9	0	1	83
Kegalle	112	793	5	59	0	4	2	17	0	6	6	65	0	13	2	75	0	2	82
Kalmunai	5	99	0	60	0	1	0	5	0	1	0	2	0	10	0	7	0	0	77
SRI LANKA	808	6735	137	2436	03	97	23	622	04	291	45	1342	13	527	257	1187	0	28	80

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 23 May, 2009 Total number of reporting units =311. Number of reporting units data provided for the current week: 246

A = Cases reported during the current week. B = Cumulative cases for the year.

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