WEEKLY EPIDEMIOLOGICAL REPORT

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WER SRI LANKA 2016

Lightning injuries (Part I)

This is the first in a series of two articles on lightning injuries.

Introduction

Lightning is one of the loveliest effects that occur in nature. However, it can cause huge damage not only to humans but also to all other living creatures.

Lightning formation

Lightning is a bright flash of electric current which originates in a charged cloud. Lightning is typically produced by cumulonimbus clouds, which have bases that are characteristically one to two kilometres above the ground and tops up to 15 kilometres in height. The occurrence, distribution and strength of a lightning is determined by several factors, including altitude, latitude, predominant wind streams, relative humidity and closeness to streams.

Still, the formation of lightning is a matter of debate. Ice inside the cloud is thought to be a leading cause for the forceful separation of positive and negative charges within the cloud. This leads to collection of negative charges at the bottom of the cloud. The formation of negative charges creates the same, but opposite electrical charges on the ground. This leaves the ground positive. A band of negative charges is repelled by the bottom of the cloud and attracted by the ground. As this streamer of negative charges approaches the ground, a streamer of positive charges is driving back from the ground and attracted to the negative streamer. When the two streamers connect, they have produced a conductive path which allows a sudden down surge of electrons to jump to the ground.

Types of lightning

There are three types of lightning; defined by the termination of a flash channel.

1. Cloud-to-ground lightning
2. Intra-cloud lightning
3. Cloud-to-cloud lightning

Magnitude of the problem

Global situation of lightning injuries

Lightning is uncommon in north and south poles of earth. Similarly, the frequency is very low over the oceans. Democratic Republic of Congo has been reported as the country where the frequency of occurrence of lightning is highest in the world. In the United States of America (USA), a lightning strike is the second highest storm related killer. The highest recording is seen in Florida. Along the Gulf of Mexico coast such as Alabama, Mississippi, Louisiana and Texas have also reported frequent lightning.

Worldwide estimate of deaths and injuries due to lightning is about 24,000 and 240,000 per year respectively. During the last few decades, the incidence of deaths due to lightning has decreased in developed countries. This reduction corresponds to shifting of a large majority of the population from rural to urban areas, reduction of the number of people working in the agricul-

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tural sector, forecasting the weather more accurately, increasing the people's awareness of the weather, improve availability and accessibility for medical services and widespread availability of fully enclosed metal-topped vehicles.

Sri Lankan situation of lightning injuries

Distribution of lightning in Sri Lanka

Sri Lanka is located in an equatorial belt in which more lightning is reported. In Sri Lanka, most of the lightning reported from the South Western part and the mountainous areas. Usually all districts experience lightning injuries, but Gampaha, Rathnapura and Kalutara reported more incidents than other districts.

Seasonal distribution of lightning strikes

Lightning occurs throughout the year in a cyclic pattern. During the inter monsoon seasons, April - May and October-November, lightning occurs more frequently which correspond to the number of thunder days. Usually lightning can be experienced in the afternoons or evenings.

Measure of lightning in Sri Lanka

In Sri Lanka 'Thunder-Day' is used as a parameter to detect lightning strikes in respective areas. Thunder-Day is defined as a calendar day that the thunder was heard in the given area.

International definition of measurement of lightning using thunder day is given as the number of thunder days per year. Department of Meteorology collects weather related information such as rainfall, temperature, pressure and thunder days via 27 meteorological stations.

Keraunic level is a system to describe lightning motion in an area based upon the audible detection of thunder. It is defined as the average number of days per year when thunder can be

heard in a given area, and the likelihood thereby of a thunderstorm. An isokeraunic map plots shapes of equal keraunic number. Although keraunic number is difficult to measure, it shows the most areas vulnerable to lightning. The isokeraunic level is between 80-120 in most of the western coastal belt and south-western slopes of the mid-country hills, indicating lightning more common in those areas

Mechanisms of damages caused by lightning

Lightning causes damages in several ways:

- Direct hit

A person struck directly by lightning and current will pass through the body to the ground. Usually isolated and tall structures in open areas are most vulnerable to this type of strikes.

- Side flash

Victims struck by a side flash are usually standing next to a taller object, often a tree. On its way to the ground, the lightning jumps from the tallest object to the person.

- Ground current

When lightning strikes a tree or other object, much of the energy travels outward from the strike in and along the ground surface. This is known as the ground current. Anyone outside near a lightning strike is potentially a victim of ground current. A person is a good conductor of electricity than the earth. Hence, a person who has one foot closer than the other to the strike point will have a potential difference between the feet and it lead to favourable environment to run the current through the legs and body rather than the ground. This usually kills large animals.

- Conduction

Lightning can move long distances through wires or metal. Metal does not attract lightning, but it does provide a path for lightning to follow. Most indoor and outdoor injuries are caused due to conduction.

Characteristics of lightning

According to the findings, the main features of lightning strikes are as follows;

- The electric current of a ground lightning flash is about 25000 Amperes.
- The potential difference between a charged cloud and the earth is about 100 million volts.
- The energy of a lightning flash is about 500 million Joules

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 to be continued….

Table 1: Selected notifiable diseases reported by Medical Officers of Health 30th – 05th Feb 2016 (06th Week)

RDHS Division	Dengue Fever		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Chickenpox		Meningitis		Leishmani-asis		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	354	2457	1	18	0	0	0	8	0	0	1	11	0	1	0	4	0	0	10	47	0	5	0	0	**88**	**94**
Gampaha	92	889	0	2	0	4	0	3	0	0	5	23	0	4	0	10	0	0	8	61	0	8	0	1	**47**	**80**
Kalutara	60	375	0	13	0	0	0	5	1	1	11	61	0	3	0	2	0	0	4	32	1	7	0	0	**86**	**93**
Kandy	51	373	4	20	0	6	0	5	1	7	6	42	0	10	1	12	0	0	3	18	0	4	0	4	**91**	**96**
Matale	11	60	0	3	0	1	0	3	0	0	3	27	3	8	1	2	0	0	2	5	1	14	1	10	**69**	**85**
NuwaraEliya	3	47	0	4	0	1	0	7	0	0	1	10	0	6	0	1	0	0	0	13	1	2	0	0	**100**	**100**
Galle	27	296	2	9	0	2	0	1	0	2	2	54	3	22	0	4	0	0	7	31	2	15	1	1	**85**	**95**
Hambantota	18	114	2	10	0	0	0	0	0	0	2	24	5	20	1	8	0	0	7	30	0	1	8	59	**100**	**100**
Matara	18	157	1	10	0	1	0	1	0	26	3	23	2	11	1	5	0	0	5	30	0	0	2	39	**100**	**100**
Jaffna	64	751	4	44	0	1	4	18	5	12	0	7	30	331	0	1	0	0	2	21	1	5	0	0	**100**	**100**
Kilinochchi	0	13	0	6	0	0	0	5	0	0	0	5	1	7	0	0	0	0	0	0	0	3	0	0	**50**	**75**
Mannar	7	49	0	2	0	3	1	6	0	0	1	7	4	22	0	0	0	0	0	1	0	0	0	0	**100**	**100**
Vavuniya	4	73	0	2	0	0	1	5	0	4	0	6	0	3	0	0	0	0	0	2	0	0	0	2	**50**	**75**
Mullaitivu	9	35	1	3	0	0	0	3	0	0	0	8	2	3	0	0	0	0	0	0	0	1	0	1	**60**	**100**
Batticaloa	18	140	7	53	0	0	1	3	0	1	1	9	0	0	2	3	0	0	4	8	0	1	0	0	**71**	**100**
Ampara	2	35	0	1	0	0	0	0	0	0	0	4	0	0	0	2	0	0	0	4	0	0	0	0	**43**	**57**
Trincomalee	12	113	0	9	0	0	0	1	0	0	0	2	0	4	0	20	0	0	2	19	0	1	0	0	**83**	**92**
Kurunegala	27	263	3	27	1	3	0	0	0	5	1	29	1	4	0	1	0	0	5	40	2	6	0	11	**74**	**96**
Puttalam	17	222	0	5	0	0	1	2	0	0	0	11	0	34	0	0	0	0	0	12	0	6	0	0	**62**	**77**
Anuradhapura	9	104	1	14	0	1	0	0	0	18	4	92	1	7	0	5	0	0	6	25	2	5	6	32	**53**	**100**
Polonnaruwa	10	64	0	8	0	0	0	6	0	0	1	35	0	0	0	0	0	0	0	9	0	1	1	22	**43**	**100**
Badulla	4	91	1	15	0	2	0	1	0	0	5	25	0	10	1	14	0	0	2	18	3	26	0	0	**82**	**94**
Monaragala	7	62	0	7	0	1	0	1	0	0	2	65	0	12	3	22	0	0	2	12	0	7	0	5	**91**	**91**
Ratnapura	11	200	1	19	0	7	0	6	0	5	4	43	1	6	3	22	0	0	5	24	3	17	0	0	**72**	**94**
Kegalle	36	231	0	5	0	3	1	11	0	7	0	44	0	3	0	4	0	0	2	53	0	4	0	0	**82**	**100**
Kalmune	25	139	0	13	0	0	0	2	0	2	0	2	0	0	0	0	1	2	1	10	0	2	0	0	**62**	**100**
SRILANKA	**896**	**7353**	**28**	**322**	**1**	**36**	**9**	**103**	**7**	**90**	**53**	**669**	**53**	**531**	**13**	**142**	**1**	**2**	**77**	**525**	**16**	**141**	**19**	**187**	**77**	**94**

Source: Weekly Returns of Communicable Diseases (WRCD).

*T=Timeliness refers to returns received on or before 05th February, 2016 Total number of reporting units 339 Number of reporting units data provided for the current week: 320 C**-Completeness

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

Table 2: Vaccine-Preventable Diseases & AFP

30th – 05th Feb 2016 (06th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2016	Number of cases during same week in 2015	Total number of cases to date in 2016	Total number of cases to date in 2015	Difference between the number of cases to date in 20156& 2015
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	01	00	00	00	00	00	01	00	02	01	07	07	0%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Mumps	03	01	00	01	02	01	00	00	00	08	04	44	43	+2.3%
Measles	01	01	03	00	02	01	01	02	00	11	20	98	157	-37.5%
Rubella	00	00	00	00	00	00	00	00	00	00	00	03	02	+50%
CRS**	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Tetanus	01	00	00	00	00	00	00	00	00	01	00	01	02	-50%
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	00	02	-100%
Whooping Cough	00	00	00	00	01	00	00	01	00	02	00	15	09	+67.1%
Tuberculosis	35	12	02	14	20	00	07	04	08	102	101	969	1082	-10.2%

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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ON STATE SERVICE

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