



WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit
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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 top up to 15 kilometres in height. The occurrence, distribution and strength of lightning are 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 of the forceful separation of positive and negative charges within the cloud. This leads to a 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

The magnitude of the problem

Global situation of lightning injuries

Lightning is uncommon on the north and south poles of the earth. Similarly, the frequency is very low over the oceans. The Democratic Republic of Congo has been reported as the country where the frequency of occurrence of lightning is the 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 coasts such as Alabama, Mississippi, Louisiana, and Texas have also reported frequent lightning. The worldwide

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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 the shifting of a large majority of the population from rural to urban areas, reduction of the number of people working in the agricultural sector, forecasting of the weather more accurately, increasing people's awareness of the weather, improving 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 in an equatorial belt in which more lightning is reported. In Sri Lanka, most of the lightning is reported from the Southwestern 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 corresponds to the number of thunder days. Usually, lightning can be experienced in the afternoons or evenings.

The 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 a given area. The 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. The 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 each area and the likelihood thereby of a thunderstorm. An isokeraunic map plots shapes of equal keraunic numbers. Although the 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 damage in several ways:

- Direct hit

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

- 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 led to a 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

Compiled by Dr. K.C. Kalubowila

Table 1: Selected notifiable diseases reported by Medical Officers of Health 15th - 21st Jan 2022 (03rd 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	30	1095	0	1	0	0	0	0	3	3	1	8	0	0	0	0	0	0	0	3	3	0	0	1	2	100	
Gampaha	28	1089	0	0	0	0	0	0	0	0	2	8	0	0	0	0	0	0	0	0	2	0	2	0	0	72	
Kalutara	88	265	2	2	0	0	0	0	0	0	11	24	0	0	0	0	0	0	0	1	6	2	2	0	0	100	
Kandy	53	232	0	2	0	0	0	0	0	0	1	11	1	1	2	3	0	0	0	1	5	0	0	0	1	97	
Matale	12	42	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	1	0	0	13	32	5	100	
NuwareEliya	12	20	1	1	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	5	100	
Galle	84	223	0	0	0	0	0	0	0	0	14	46	1	3	0	0	0	0	0	1	2	1	2	0	0	100	
Hambantota	19	76	2	4	0	0	0	0	0	0	1	12	0	3	0	1	0	0	0	0	0	0	6	42	0	100	
Matara	21	63	1	1	0	0	0	0	0	0	8	10	0	0	0	0	0	0	0	2	2	0	1	12	26	4	100
Jaftna	92	294	0	1	0	0	3	11	1	4	3	7	30	93	0	0	0	0	0	7	13	0	0	0	31	88	
Kilinochchi	7	17	1	1	0	0	0	0	1	1	1	1	2	3	0	0	0	0	0	0	0	0	0	1	1	25	100
Mannar	26	81	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	31	87	
Vavuniya	7	13	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	100	
Mullaitivu	6	10	0	0	0	0	0	2	0	0	2	4	1	1	0	0	0	0	0	1	1	0	0	0	11	100	
Batticaloa	31	95	3	8	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	1	0	4	0	26	100	
Ampara	5	26	0	2	0	0	0	0	0	0	3	12	1	1	0	0	0	0	0	2	7	2	3	0	14	100	
Trincomalee	37	89	0	1	0	0	0	1	0	0	0	1	0	0	0	4	0	0	0	0	0	0	2	0	21	92	
Kurunegala	21	523	0	1	0	1	0	0	0	0	2	14	4	6	0	0	0	0	0	1	3	1	2	29	53	0	100
Puttalam	12	347	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0	3	0	0	11	92	
Anuradhapur	16	45	0	0	0	0	0	0	0	0	9	28	0	1	0	1	0	1	0	1	0	2	4	36	0	93	
Polonnaruwa	7	20	0	1	0	0	0	0	1	1	2	19	0	0	0	0	0	0	0	0	0	0	0	4	21	0	88
Badulla	60	188	1	4	0	0	0	0	0	0	4	24	1	3	3	10	0	0	1	2	2	0	1	2	0	100	
Monaragala	13	26	0	0	0	0	0	1	1	1	18	40	3	3	3	5	0	0	2	2	2	4	6	2	7	0	100
Ratnapura	51	195	2	4	0	2	0	1	5	11	20	89	0	2	0	1	0	0	1	2	2	0	0	1	9	0	95
Kegalle	33	131	0	1	0	0	0	1	1	3	10	58	1	1	0	0	0	0	2	3	1	4	1	2	0	100	
Kalmune	14	27	6	9	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	18	100	
SRI LANKA	16	5232	20	45	0	4	3	17	13	24	11	436	45	122	8	25	0	1	25	56	11	39	74	232	6	95	

Source: Weekly Returns of Communicable Diseases (esurveillance.epid.gov.lk). T=Timeliness refers to returns received on or before 21st Jan , 2022 Total number of reporting units 361 Number of reporting units data provided for the current week: 345 C**-Completeness

Table 2: Vaccine-Preventable Diseases & AFP 15th – 21st Jan 2022 (03rd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2022	Number of cases during same week in 2021	Total number of cases to date in 2022	Total number of cases to date in 2021	Difference between the number of cases to date in 2022 & 2021
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	01	01	00	00	00	00	01	00	03	01	04	02	100 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	00	00	00	00	01	00	01	00	00	02	02	03	05	- 40 %
Measles	00	00	00	00	00	00	00	01	00	01	01	01	02	- 50 %
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	01	01	00	01	00	0 %
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Japanese Encephalitis	00	00	00	00	00	01	00	00	00	01	00	01	00	0 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Tuberculosis	46	14	00	01	10	15	00	03	16	105	124	276	305	- 9.5 %

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

Number of Malaria Cases Up to End of January 2022,

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All are Imported!!!

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@slt.net.lk. **Prior approval should be obtained from the Epidemiology Unit before publishing data in this publication**

ON STATE SERVICE

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