This is the first in a series of two articles on Scrub typhus

Background

Scrub typhus is an acute, febrile, infectious illness that is caused by Orientia (formerly Rickettsia) tsutsugamushi. It is also known as the tsutsugamushi disease. Scrub typhus was first described from Japan in 1899. Humans are accidental hosts in this zoonotic disease. The term scrub is used because of the type of vegetation (terrain between woods and clearings) that harbours the vector; however, the name is not entirely correct because certain endemic areas can also be sandy, semi-arid and mountain deserts.

Scrub typhus, a dreaded disease in pre-antibiotic era, is a militarily important disease that caused thousands of cases in the Far East during the Second World War. Soldiers were exposed to chigger bites in forest areas during military operations. It is estimated that 36,000 soldiers were either incapacitated or died during World War II. The overall mortality varied from 7% to 9%, second only to malaria among infectious diseases. Furthermore, severe epidemics of the disease occurred among troops in Myanmar (Burma) and Sri Lanka during World War II.

The disease continued to be of military significance during the Malayan Emergency. It was suspected to be the leading cause of pyrexia of unknown origin (PUOs) in forces of the United States (US) of America during the Vietnam conflict, and caused two confirmed cases among the US troops during the Korean War.

Epidemiology of Scrub typhus

Scrub typhus is endemic to a part of the world known as the “tsutsugamushi triangle”, which extends from northern Japan and far-eastern Russia in the north, to northern Australia in the south, and to Pakistan in the west. Scrub typhus is essentially an occupational disease among rural residents in the Asia-Pacific region. In oil-palm workers in Malaysia, the incidence of antibodies to scrub typhus declines with declining grass density between the rows of maturing oil-palm. This correlates with the decline of chigger populations in this habitat. An increase in the prevalence of scrub typhus has been reported from some Asian countries, which coincides with the widespread use of β-lactam antimicrobial drugs and urbanization in rural areas.

Scrub typhus is difficult to recognize and diagnose because the symptoms and signs of the illness are often non-specific. The non-specific presentation and lack of the characteristic eschar in 40% patients makes the misdiagnosis and underreporting of scrub typhus common. On the other hand, diagnostic facilities are not available in much of its native range. Therefore, the precise incidence of the disease is unknown.

An estimated one billion people are at risk for scrub typhus and an estimated one million cases occur annually. Mortality rates in untreated patients range from 0-30%.

The characteristic feature of an outbreak of scrub typhus are:

(i) the obvious association with certain types of terrain
(ii) the marked localization of many cases within certain small foci
(iii) the large percentage of susceptible people, who may be infected simultaneously following exposure over relatively short periods
(iv) the absence of a history of bites or attack by arthropods

South-East Asia Region

The vector of scrub typhus is present in most countries of the South-East Asia Region and it is endemic in certain geographical regions of India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka and Thailand.

Seasonality

The seasonal occurrence of scrub typhus varies with the climate in different countries. The period of epidemic is influenced by the activities of the infected mite. It occurs more frequently during the rainy season. However, outbreaks have been reported during the cooler season in southern India. Certain areas such as forest clearings, riverbanks and grassy regions provide optimal conditions for the infected
mites to thrive

Agent

It is an obligate intracellular gram-negative bacterium that has a large number of serotypes. This pathogen does not have a vacuolar membrane; thus, it grows freely in the cytoplasm of infected cells. Because they are intracellular parasites, they can live only within the cells of other animals. Even though it is recognized as one of the tropical rickettsioses diseases, O. tsutsugamushi has a different cell wall structure and genetic composition than that of the rickettsiae. O. tsutsugamushi includes heterogeneous strains classified in five major serotypes: Boryon, Gilliam, Karp, Kato and Kawazaki.

Differentiation of serotypes is important for laboratory diagnosis. Orientia tsutsugamushi can be cultivated on L929 cells and stained using the Giemsa method.

Transmission

Scrub typhus is transmitted to humans and rodents by some species of trombiculid mites (“chiggers”, Leptotrombidium deliense and others). The mite is very small (0.2 – 0.4mm) and can only be seen through a microscope or magnifying glass. Humans acquire the disease from the bite of an infected chigger. The bite of the mite leaves a characteristic black eschar that is useful to the doctor for making the diagnosis.

The adult mites have a four-stage lifecycle: egg, larva, nymph and adult. The larva is the only stage (chigger) that can transmit the disease to humans and other vertebrates, since the other life stages (nymph and adult) do not feed on vertebrate animals. Both the nymph and the adult are free-living in the soil.

Chigger mites act as the primary reservoirs for O. tsutsugamushi. Once they are infected in nature by feeding on the body fluid of small mammals, including the rodents, they maintain the infection throughout their life stages and, as adults, pass the infection on to their eggs by transovarial transmission. Similarly, the infection passes from the egg to the larva or adult in a process called transstadial transmission.

In this way, chigger mite populations can autonomously maintain their infectivity over long periods of time.

Early workers thought that rodents were the natural reservoir of infection, but it is now believed that mites are both the vector and the reservoir.

This mite is fastidious in matters of temperature, humidity and food and finds everything suitable in restricted areas. Scrub typhus is generally seen in people whose occupational or recreational activities bring them into contact with ecotypes favourable for vector chiggers.

Incubation period

The incubation period of scrub typhus is about 5 to 20 days (mean, 10-12 days) after the initial bite.

Clinical Features

The chigger bite is painless and may become noticed as a transient localized itch. Bites are often found on the groin, axillae, genetalia or neck. An eschar is often seen in humans at the site of the chigger bite. The illness begins rather suddenly with shaking chills, fever, severe headache, infection of the mucous membrane lining the eyes (the conjunctiva) and swelling of the lymph nodes. A spotted rash on the trunk may be present. Eschars are rare in patients in countries of South-East Asia and indigenous persons of typhus-endemic areas commonly have less severe illness, often without rash or eschar.

Whether this is due to past exposure to the organism, or to other factors, is unknown. Symptoms may include muscle and gastrointestinal pains. More virulent strains of O. tsutsugamushi can cause haemorrhage and intravascular coagulation.

Acute scrub typhus appears to improve viral loads in patients with HIV. This interaction is currently unexplained. Clinical scrub typhus is not known to occur naturally in animals.

Source-Frequently Asked Questions-ScrubTyphus, av ailble from http://www.searo.who.int/entity/emerging_diseases/CDS_faq_Scrub_Typhus.pdf

Compiled by Dr. Madhava Gunasekera of the Epidemiology Unit
| Disease | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Dengue Fever | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Encephalitis | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Typhus Fever | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Cholera | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Hepatitis | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Chickenpox | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |

**WER Sri Lanka**

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

| Disease | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Sri Lanka | 354 | 27821 | 72 | 38682 | 2 | 330 | 2 | 109 | 12 | 1526 | 79 | 3689 | 11 | 2125 | 1933 | 2153 | 1963 | 2100 | 24 | 60 | 3650 | 12 | 1153 | 17 | 1168 | 79 | 21 |

**Source:** Weekly Reports of Communicable Diseases (WRCD)
## Table 1: Vaccine-Preventable Diseases & AFP

<table>
<thead>
<tr>
<th>Disease</th>
<th>No. of Cases by Province</th>
<th>Number of cases during current week in 2013</th>
<th>Number of cases during same week in 2012</th>
<th>Total number of cases to date in 2013</th>
<th>Total number of cases to date in 2012</th>
<th>Difference between the number of cases to date in 2013 &amp; 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AFP</strong>*</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 01 00 00 01 02 91 70</td>
<td>-</td>
<td></td>
<td></td>
<td>+30%</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 00 00 00 00 00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mumps</td>
<td>W C S N E NW NC U Sab</td>
<td>05 02 02 02 04 01 02 01 04 22 34 1376</td>
<td>4074</td>
<td>70</td>
<td></td>
<td>-66.2%</td>
</tr>
<tr>
<td>Measles</td>
<td>W C S N E NW NC U Sab</td>
<td>13 01 08 01 03 03 05 04 22 60 01 3631</td>
<td>60</td>
<td>60</td>
<td>5951.7%</td>
<td>+5951.7%</td>
</tr>
<tr>
<td>Rubella</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 00 00 00 00 00</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CRS**</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 00 00 00 00 00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tetanus</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 00 00 00 00 00</td>
<td>-</td>
<td>22</td>
<td>12</td>
<td>+83.3%</td>
</tr>
<tr>
<td>Neonatal Tetanus</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 00 00 00 00 00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Japanese Encephalitis</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 00 00 00 00 00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Whooping Cough</td>
<td>W C S N E NW NC U Sab</td>
<td>00 00 00 00 00 00 00 00 00 00</td>
<td>-</td>
<td>68</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>W C S N E NW NC U Sab</td>
<td>160 03 35 03 06 01 23 21 26 264</td>
<td>7818</td>
<td></td>
<td></td>
<td>-6.0%</td>
</tr>
</tbody>
</table>

### 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:** Kilinochchi
- **MN:** Mannar
- **VA:** Vavuniya
- **MU:** Mullaitivu
- **BT:** Batticaloa
- **AM:** Ampara
- **TR:** Trincomalee
- **KM:** Kalmunai
- **KR:** Kurunegala
- **Pu:** Puttalam
- **AP:** Anuradhapura
- **BD:** Badulla
- **MD:** 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

### Influenza Surveillance in Sentinel Hospitals - ILI & SARI (Oct /2013)

<table>
<thead>
<tr>
<th>Month</th>
<th>Human</th>
<th>Animal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Received</td>
<td>Infl A untyped</td>
</tr>
<tr>
<td>October</td>
<td>309</td>
<td>4</td>
</tr>
</tbody>
</table>

*Source: Medical Research Institute & Veterinary Research Institute*

**PRINTING OF THIS PUBLICATION IS FUNDED BY THE WORLD HEALTH ORGANIZATION (WHO).**

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**