

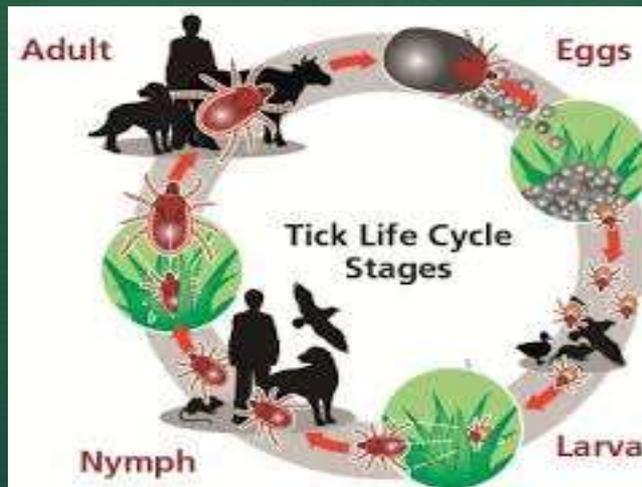
Tick borne Diseases of Public
Significance in Pakistan and
Integrated Vector
Management of Vectors
Responsible

Presented by Prof Dr Azhar Maqbool

Prepared by Shifa Ul Haq

Ticks Biology

- Ticks are blood-feeding arthropods related to spiders and mites. They are not insects
- Ticks pass through four stages in their life cycle: egg, larva, nymph and adult. All stages except the egg are blood-sucking parasites



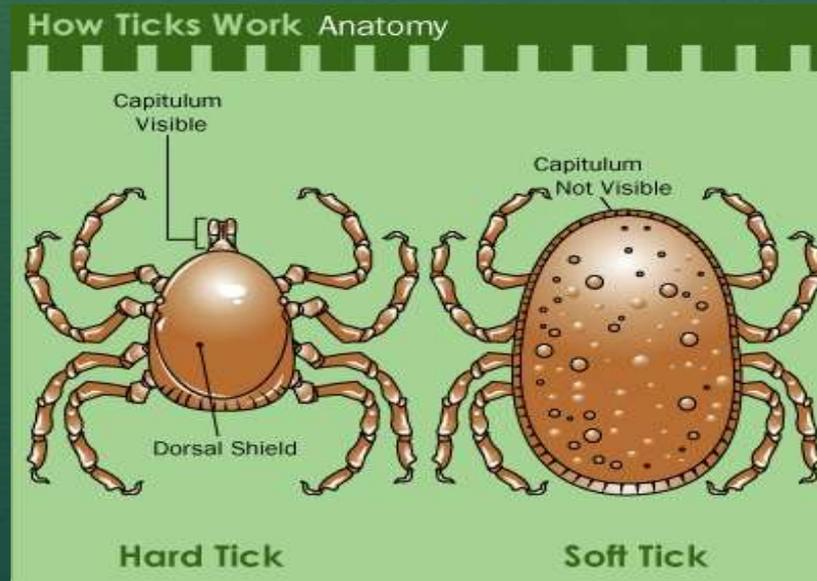
Ticks Biology



- Ticks can feed on a variety of animals including birds, amphibians, reptiles, and mammals (including people)
- The larvae and nymphs often feed on smaller animals and birds. Some nymphs and adults typically feed on larger animals, including humans and their companion animals
- There are approximately 800 species of tick worldwide; of the 80 or so species in Pakistan

Classification of Ticks

- Taxonomically, ticks are classified into two main groups
 - ✓ Hard Tick
 - ✓ Soft Tick



Classification of Ticks

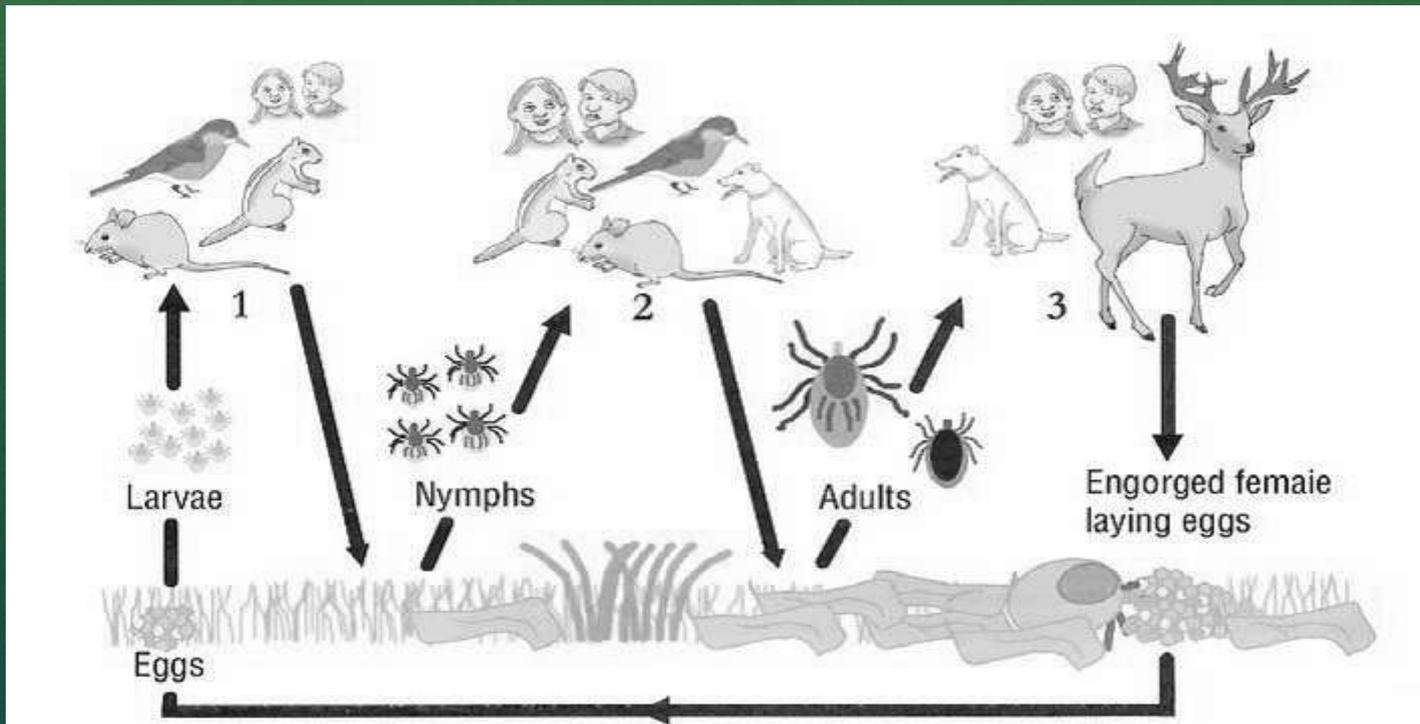
- **Soft Tick** belongs to Argasidae, have cuticle that is more pliable, generally these ticks confine themselves to more protected environments. Mouthparts are located on the ventral surface.
- **Soft ticks** are Ornithodoros, Argas. The species of Ornithodoros that infest man live hidden in the ground, in tools and equipment, and in the cracks of shack or cabin walls and emerge at night to suck blood from people or chickens that take shelter there. Adult survive between 9-56 months without feeding. Larvae feed by day as well as by night and remain attached to the host's skin sucking blood for several days.

Classification of Ticks

- **Hard Tick** belongs to family Ixodidae have a hard cuticle. In males it covers the entire body where as in females a scutum covers the front third of the arthropod and the abdomen is compromised of a series of folds that extend as the female engorge during feeding mouth parts are located as the anterior surface
- Among the **hard ticks**, the species of the genera *Amblyomma*, *Boophilus*, *Dermacentor*, *Haemaphysalis*, *Hyalomma*, *Ixodes* and *Rhipicephalus* are important in human medicine. Adult females suck blood in amount that exceeds 10 times her body weight for several days

Classification of Ticks

- Ticks can be further characterized by how many hosts they utilize to complete their life cycle (e.g. one, two or three host-ticks)



Effects of Ticks

- Human can be infested by 12 species of soft ticks and 22 species of hard ticks like Argas, Ornithodoros, Amblyomma, Ixodes, Dermacentor, Hyalomma and Haemophysalis. It is important to know that when tick remove from the host forcefully and mouth parts remain in the wound it causes granuloma that look like a pustules and lasts for several weeks and causes otocariasis in humans. Sometime tick causes allergies ranging from erythema to ulcerative lesions. Paralysis is very common in human caused by various species of ticks like Dermacentor, Haemaphysalis, Hyalomma, Ixodes, Rhipicephalus and Argas

Important Tick borne Diseases

what
diseases do
ticks
carry?



Crimean-Congo hemorrhagic fever

- CCHF is caused by a tick-borne virus (Nairovirus). The disease was first characterized in the Crimea in 1944 and given the name Crimean hemorrhagic fever. It was then later recognized in 1969 as the cause of illness in the Congo, thus resulting in the current name of the disease.
- Contact with infected material, broken skin or scratch on the skin, consumption of un-boiled or uncooked meat and milk of infected animal may be a potential source of infection.

CCHF...

- Tick of genus *Hyalomma* act as both reservoir as well as vector for this disease. Transovarial, transstadial and venereal mode of transmission of virus is seen in vector.
- Animal herders, livestock workers, and slaughterhouse workers in endemic areas are at risk of CCHF.
- **Clinical Signs:** fever, chills, headache, dizziness, photophobia, Haematuria, epistaxis, respirating distress are the important signs in humans.

Lyme Disease

- Lyme disease was first identified in 1975 in Lyme, Connecticut
- It is known as the “great imitator” because the symptoms of Lyme disease can mimic many other illnesses.
- Lyme disease is also called arthritis. It is a tick borne disease in humans and dogs and to a lesser extent in horses, cattle and cat. Tick of genus Ixodes (Deer Tick) which transmit Borrelia is the main vector.
- The tick has a 2 year life cycle. One adult female tick produce 2000 eggs in the spring then larvae emerge. They feed a first host (Mouse). After feeding, larvae lay dormant until the following spring when they molt to nymph feeding the humans and dogs and lay dormant. Then molt to adult. Adult attaches to deer.

Lyme Disease

- **Sign:** Erythema migrans (expanding red rash) is the 1st definite signs then fever, swelling of lymph nodes and pain/swelling of one or more joints. Lameness-arthritis is the important signs in humans.
- About 60% of those infected who have not been treated experience arthritis several months after the bite

Human Granulocytic Anaplasmosis

- Anaplasmosis is a tick borne disease caused by the bacterium *Anaplasma phagocytophilum*. It was previously known as human granulocytic ehrlichiosis (HGE) and has more recently been called human granulocytic anaplasmosis (HGA).
- Human anaplasmosis (HA) was first recognized during 1993 in several patients from Minnesota
- Sporadic cases seen throughout the world
- The bacteria infect white blood cells called neutrophils

Human Anaplasmosis

- Transmitted by the bite of *Ixodes scapularis* and *I. pacificus* and *Dermacentor variabilis*
- These ticks also transmit Lyme disease
- Signs include sudden high fever, lymph node swelling, severe headache, muscle aches, chills and shaking
- Severe complications can include respiratory failure and renal, and secondary infections

Babesiosis/Piroplasmosis

- It's a malaria like disease
- The parasite affect red blood cells.
- Protozoan of genus Babesia is the agent of disease (B microti, B divergens)
- Ticks of genus Ixodes, Boophilus, Rhipicephalus are vectors of the disease
- Initial symptoms may occur 1 to 8 weeks after an infected tick bite
- Apart from tick bite, blood transfer and use of infected surgical instruments are also risk factors

Q Fever

- Q fever is a worldwide disease caused by the bacteria *Coxiella burnetii*. Cattle, sheep, and goats are the primary reservoirs
- Infection of humans usually occurs by inhalation of organisms from air that contains airborne barnyard dust contaminated by dried placental material, birth fluids, and excreta of infected animals. Other modes of transmission to humans, including tick bites, ingestion of unpasteurized milk or dairy products
- Ticks of genus *Ixodes* and *Amblyomma* are vectors
- Organism survive in contaminated milk 3 months and also can survive in ticks feces

Integrated Vector Management

- Integrated vector management (IVM) basically involves the selection and use of several methods to reduce, rather than eliminate a vector population
- For ticks, this may involve the use of landscape practices to reduce tick and host animal habitat adjacent to the home, management or treatment of host animals, targeted applications of least-toxic pesticides to high-risk tick habitat—all in conjunction with tick checks and other personal protective measures to either reduce the number of infected ticks and number of tick bites. The ultimate goal, of course, is to reduce the number of human cases of disease as much as possible with the resources available.

Integrated Vector Management



- 1- Minimize Exposure To Ticks
- 2- Sanitation and Exclusion
- 3- Chemical Control
- 4- Biological Control

1- Minimize Exposure To Ticks

- Wear light colored clothing in wooded areas or places that tick are known to infest. Ticks are easier to see on light colors so you can remove them before they attach.



1- Minimize Exposure To Ticks

- Tuck pant legs into socks, boots or shoe to prevent ticks from crawling up under clothing



1- Minimize Exposure To Ticks

- Normally, ticks must attach for several hours before a disease agent is passed from tick to man. Therefore, if you remove ticks promptly, you greatly reduce your chances of getting disease.
- Apply an insect repellent containing DEET to boots or shoe tops, around the waist, and on exposed skin. In heavily infested areas, you may want to use permethrin on clothing. Permethrin is not for use on skin. Make sure that clothing treated with permethrin dries for at least 2 hours before use.

1- Minimize Exposure To Ticks

- Wash and dry clothing at the highest temperature upon returning from a tick-infested area.
- Examine yourself carefully for ticks after leaving the woods or tick-infested area. Check especially the hair, shoulders, armpits, waist, and inner thighs
- Educate students, families, and school staff about ticks, tick-vectored diseases, and the proper use of repellents.

2- Sanitation and Exclusion

- Keep grass mowed
- Remove leaf litter, brush and weeds at the edge of the lawn
- Remove brush and leaves around stonewalls and wood piles



2- Sanitation and Exclusion

- Discourage rodent activity: Cleanup and seal and small openings around the home
- Move firewood piles and bird feeders away from the house



2- Sanitation and Exclusion

- Trim tree branches and shrubs around the lawn edge to let in more sunlight. Bright, sunny areas are less likely to harbor ticks.
- Create a minimum 3 foot barrier. Shown by arrows
- Try not to use ground cover around house



2- Sanitation and Exclusion

- Widen woodland, exercise or hiking trails
- Manage pet activity; keep dogs and cats out of the woods to reduce ticks brought back into the home
- Use plantings that do not attract deer and other tick host animals for ticks



2- Sanitation and Exclusion

- Isolate areas used by the family or public (i.e., lawns, play areas, recreational or ball fields) from tick habitat or tick hot spots (i.e., woods, dense vegetation, groundcover, stonewalls)



3- Chemical Control

- Treat or eliminate the host animals (deer, mice etc.) because ticks are ectoparasites
- Restrict application of pesticides to high-risk tick habitat such as edges of lawn and woodlands. Spraying open fields and lawns is not necessary
- Selectively use insecticides. Ticks can survive longer period so treat the pet area on the same day as you treat the pet
- Application at the interval of 2 to 4 weeks may be needed

3- Chemical Control

Pets can carry ticks into the home. If the pet is not allowed to freely roam into the wooded areas, it is less likely to pick up ticks. Treat pet with acaricidal/insecticidal drugs

Warning!



Apply chemicals only where needed or justified. Before using any chemical, please read the label carefully for directions on application procedures, appropriate rate, first aid, storage, and disposal.

4- Biological Control

- Several species of ants are known to feed on ticks
- Numerous birds feed on ticks
 - ✓ Chicken
 - ✓ Guinea fowls



4- Biological Control

- Parasitoid wasps are also used as biological control of ticks.
- Ixodiphagus wasps are very efficient parasites of ticks that achieve 25 to 50% natural parasitization rates.
- Each wasp deposits 6 or more eggs inside an engorged tick.
- Successful trials have been conducted on *Metarhizium* fungus to control ticks. When the spores of these fungi come in contact with the ticks or insects they stick to their cuticle.

Thank You!

**Prof Dr Azhar
Maqbool**

To contact me

Please Google

“Shifa Ul Haq”

Dr Shifa Ul Haq