Kala-azar

Why In News?
Researchers have stumbled upon evidence of an unknown virus that may be responsible for the persistence of kala-azar or visceral leishmaniasis, a parasite infection that has spawned epidemics and sickened thousands of Indians for over a century.

FACTS (For Prelims)

What is Kala-azar?
i) Kala-azar is a slow progressing indigenous disease caused by a protozoan parasite of genus Leishmania

ii) In India, Leishmania donovani is the only parasite causing this disease

iii) The parasite primarily infects the reticuloendothelial system and may be found in abundance in bone marrow, spleen, and liver.

iv) Post Kala-azar Dermal Leishmaniasis (PKDL) is a condition when Leishmania donovani invades skin cells, resides and develops there and manifests as dermal lesions. Some of the kala-azar cases manifest PKDL after a few years of treatment. Recently it is believed that PKDL may appear without passing through the visceral stage. However, adequate data is yet to be generated on course of PKDL manifestation

What is Post Kala-Azar Dermal Leishmaniasis (PKDL)?
Post-Kala-azar Dermal Leishmaniasis is a condition in which Leishmania donovani parasites are found in the skin. PKDL develops in some of the Indian kala-azar patients usually 1-2 years or more following recovery of Kala-azar; less commonly without suffering from Kala-azar

How is Kala-azar transmitted?
Kala-azar is a vector-borne disease. Sandfly of genus Phlebotomus argentipes are the only known vectors of kala-azar in India

Indian Kala-azar has a unique epidemiological feature of being Anthroponotic - human is the only known reservoir of infection
Female sandflies pick up parasite (Amastigote or LD bodies) while feeding on an infected human host.

Parasite undergoes morphological change to become flagellate (Promastigote or Leptomonad), development and multiplication in the gut of sandflies and move to mouthparts. Healthy human hosts get infection when an infective sandfly vector bites them
kala-azar In India

India has around 3,000 people afflicted with kala-azar, accounting for 50% of the global burden. It is endemic in West Bengal, Bihar, Jharkhand and eastern Uttar Pradesh.

Treatment for kala-azar (a disease caused by Leishmania infection) is limited due to high toxicity to human cells, low efficacy of the drug, high cost and drug resistance making the development of novel anti-kala-azar drugs a priority.

Recent Research

i) Historically, the parasite Leishmania donovani is believed to be responsible for the dreaded infection. Recently a group of scientists from West Bengal and Uttar Pradesh have said that another parasite called Leptomonas seymouri may also be involved.

ii) Beta-Galf is a major cell surface component of Leishmania parasite and is responsible for the virulence of the pathogens and plays an essential role in parasite survival and transmission of disease. Beta-Galf is also found in Mycobacterium tuberculosis that causes TB and Trypanosoma cruzi parasite that causes sleeping sickness but is absent in humans.

iii) Three active inhibitor molecules were selected from the PubChem database and one of them showed the highest stability in binding to the active sites of the target enzyme (UDP-galactopyranose mutase or UGM) which helps in the formation of glycoprotein, beta-Galf. After binding to the UGM, the molecule inhibits the enzyme activity thereby reducing the virulence, parasite survival and transmission of disease.

What is PubChem?
PubChem is a database of chemical molecules and their activities against biological assays. The system is maintained by the National Center for Biotechnology Information (NCBI), a component of the National Library of Medicine, which is part of the United States National Institutes of Health (NIH).

PubChem can be accessed for free through a web user interface. Millions of compound structures and descriptive datasets can be freely downloaded via FTP. PubChem contains substance descriptions and small molecules with fewer than 1000 atoms and 1000 bonds. More than 80 database vendors contribute to the growing PubChem database.

SOURCE: The Hindu (28th October 2017)