

One vector more than one infection: Can occur simultaneously

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Vector borne diseases (VBD) are getting more and more attention over the last few years and World Health Organization (WHO) in association with local bodies are working to cut down morbidity and mortality associated with these diseases. According to WHO fact sheet VBD account for 17% of all infectious diseases, causing more than 0.7 million deaths per annum.¹

The most common of these diseases includes Malaria, Dengue and Chikungunya spread by mosquito bites. Malaria, a parasitic infection, transmitted via Anopheles, Dengue, a viral infection, transmitted via Aedes mosquito and Chikungunya, another viral infection transmitted via Aedes mosquito. These infections can occur separately or simultaneously. The mosquito is the most common vector transmitting infections to human beings, along with three above mentioned infections other transmitted diseases via mosquitoes include yellow fever, Zika virus, Japanese encephalitis, lymphatic filariasis, Rift Valley fever and West Nile fever occurring with different frequencies in different parts of world.¹

Malaria

This is a protozoal parasitic infection of plasmodium; there are 4 species which can cause infection in human, most common are falciparum and vivax, transmitted through female Anopheles mosquitoes. It is endemic throughout south and east Asia, south America and Africa. According to a 2018 WHO report, malaria affected 228 million people worldwide, causing death to 405,000 people, mostly residing in the tropics / or mainly in Low Income Countries and Low and Middle Income Countries.²

Previously most complications were reported with falciparum malaria which included cerebral malaria, renal failure, respiratory distress syndrome, hepatic failure, other organ or system failures like pancreatitis, coagulation failure etc.³ But recently trends have been changed and almost similar pattern of complications have been reported with vivax malaria as well.⁴ Diagnosis of malaria is easy with thick and thin peripheral blood smears stained with Giemsa. This can be performed at

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limited resource centres and helps in grading the type of parasitaemia. Treatment for uncomplicated malaria is also easily available and is cost effective. But problems arise with complicated or drug resistant malaria.

Dengue

It develops with the Flaviviridae family virus which has 4 serotypes (DENV 1-4). Transmitted to humans via Aedes mosquito, is mostly reported from tropical and subtropical countries. Internationally an estimated figure of people at risk of being affected with this infection has been reported around 2.5 billion, with a prevalence in approximately 50 million, 0.1% of these develop severe disease. Mortality has been reported up to 5% of hospitalized patients with dengue, deaths usually occur in patients who develop haemorrhagic fever or shock syndrome.⁵ Other organs failure like renal failure has also been reported with dengue infection.⁶ Thrombocytopenia and bleeding tendencies are most common along with febrile illness in patients with dengue infection. In Pakistan; from 1995 to 2019, there were around 1,47, 200 cases of dengue infection and over 800 deaths.⁷

Diagnosis is established with viral cultures or detection of viral genome or antigens. Serological test for presence of immunoglobulins M or G are done, but not available at many health facilities in LMICs or MICs. Many nucleic acid amplification tests (NAATs) have also been developed some do serotyping while others are quantitative. Single RT-PCR based are most common among NAATs, whereas nested RT-PCR or multiplex RT-PCR can also be performed. There is no specific treatment or vaccination available against dengue infection so far and management is mostly supportive. The main hindrance in developing a vaccine is the reported frequent association of dengue haemorrhagic fever or shock syndrome with secondary infections.⁵

Chikungunya

An Arbovirus from the family Togaviridae (CHIKV) is transmitted via bites of infected Aedes mosquito, believed to have originated from Africa. Over the past few years many tropical countries have seen an upsurge of this particular infection. Symptomatically along with a febrile illness patients have severe arthralgias, skin rash and headache. Many patients develop neurological,

cardiovascular, pulmonary, renal, ocular, and cutaneous sequelae following the acute infection.⁸ Diagnosis is made by RT-PCR, viral culture or ELISA based tests to check anti CHIKV immunoglobulin M and G antibodies which has lower sensitivity and specificity than RT-PCR. As these specialized tests cannot be performed at many affected areas and localities with limited resources and health facilities, infection remains underdiagnosed. Mostly diagnosis is assumed with clinical presentation and as no specific treatment or vaccine is available, management remains supportive.

Concurrent infections

Malaria and Dengue together have been reported in literature. A study from Karachi, Pakistan, reported 26 cases (25 vivax and one of falciparum) along with dengue.⁹ Another study from Lahore described 17 cases with dual infection, 14 had vivax and 3 falciparum malaria along with dengue.¹⁰

Dengue and Chikungunya together has not been reported from Pakistan, but many cases have been quoted from, India and other countries. Largest series from India revealed 532 cases of these co-infections. In this study diagnosis was based on ELISA based IgM finding of both viruses.¹¹

Malaria and Chikungunya: only one study from Asia which comprised of 20 cases of co infection¹² and the remaining were from Africa.

Malaria, Dengue and Chikungunya have been documented from India with three single case reports. All the three infections were found in one patient with another study reporting two cases.¹² Another study from Africa reported 4 cases of such patients.¹³

Conclusion

These three vector borne diseases have a common epidemic pattern as most cases are reported from tropical or subtropical regions of the world. The clinical

presentation is also similar to some extent, thus a concurrent infection occurring in the same person is often overlooked and under reported. Despite similar clinical presentation the course of treatment is entirely different for all three diseases. Malaria is treated with antimalarial drugs while in case of Dengue and Chikungunya no vaccine or drug is available and clinicians rely on supportive therapy. Preventive measures for eradication of mosquitoes is extremely important to prevent these three infections. Authorities should take strict measures to implement the planned control measures and avoid further epidemics.

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