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SALINITY-TOLERANT MOSQUITOS INCREASE TRANSMISSION RISK OF MOSQUITO-BORNE DISEASES IN A WARMING WORLD

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Background:

Global warming, by altering temperature, rainfall and humidity, can increase transmission of mosquito-borne diseases in many countries due in part to enhanced vector breeding and survival. Global warming will also raise sea levels, leading to an increase in brackish/saline water bodies in coastal areas. Vector mosquitoes possessing salinity-tolerant larvae and pupae include *Anopheles subpictus*, *Anopheles sundaicus*, *Aedes vigilax* and *Culex sitiens* in Southeast Asia. Larvae of salinity-tolerant mosquitoes have specific physiological mechanisms to survive salinity changes. Tropical Asian countries possess many lagoons, coastal marshes, mangroves and estuaries, and a high coastline to land area ratio. An expansion of brackish/saline water bodies in coastal areas will increase densities of salinity-tolerant vectors, and lead to the adaptation of freshwater vectors to breed in brackish (0.5-30 ppt salt) and saline (>30 ppt salt) waters. This perspective on vector-borne diseases has not previously been appreciated.

Methods:

The salinity tolerance of the larvae of selected anopheline and culicine mosquito vectors were determined under laboratory and field conditions in Sri Lanka and Brunei Darussalam.

Results:

Anopheles culicifacies a major vector of malaria that typically breeds in freshwater is also able to breed in brackish waters in eastern Sri Lanka. Observations on other freshwater mosquito vectors of human disease suggest that many are able to adapt to breed in brackish or even saline water.

Conclusions:

Over half the world's population presently lives within 60 km of the coast and coastal urbanization is expected to increase markedly in tropical Asia. Greater host density, by increasing vector-host contact, will also increase transmission rates. However mosquito-borne disease control programs addressing larval breeding largely focus on freshwater breeding habitats. Hence there is a need to more closely monitor breeding of brackish/saline water-tolerant mosquito vectors and attendant disease incidence rates, and take steps to reduce vector breeding in coastal areas.

Keywords:

Anopheles culicifacies, malaria, mosquito-borne diseases, salinity tolerant mosquitoes, tropical Asia