

Commentary

Muscoid flies in tsunami hit areas & their management

Natural disasters earthquakes, volcanoes, landslides, tsunamis, floods and droughts are catastrophic events which can have a serious impact on health of the society. Triggered by severe earthquakes off the northwest tip of Indonesia, early on Sunday 26 December 2004, a tsunami brought catastrophe on an unprecedented scale, disaster to six countries of the WHO South-East Asia Region¹. The death toll was more than 2.75 lakh with over 4.35 million people affected and displaced. In India, 16389 casualties occurred into the maximum displaced among all countries¹.

Rapid response teams of governments at the National and State level in India carried out rescue and relief operations; non-governmental agencies also actively supported in these operations². The tsunami-affected people were quickly accommodated in relief camps, and the basic facilities like food, clean water, clothes, medical care and other essential items were provided. In the tsunami-affected villages, the public-health activities in the relief camps were mainly providing sanitation, medical facilities, mosquito control and fever surveillance².

There is a relationship between natural disasters and communicable diseases. The risk for outbreaks¹ is usually very high a fear derived perhaps from perceived association between dead bodies and epidemics³. In any natural disaster, population displacement is one of the major factor which may be responsible for disease outbreak. In addition, there are other factors that may influence the risk for communicable diseases and death in the affected population such as availability of safe water and sanitation facilities, the degree of crowding, the underlying health status of the population, and the availability of healthcare services, all of these interact within the context of the local disease ecology³.

Altered environment in disasters may create congenial condition for sudden buildup of insects population. Watson *et al*³ mentioned that natural disasters, particularly meteorologic events can affect vector breeding sites and vector borne disease transmission. In one of the studies during vector borne surveillance at tsunami hit coastal villages of southern India, Balraman *et al*² feared the risk of outbreak of vector borne diseases as the presence of flies possibly may lead to transmission of gastroenteric diseases. It was also noticed that altered environment in South Andaman, Andaman & Nicobar Islands of India, affected by tsunami increased the risk of vector abundance with enhanced malaria transmission potential due to the vastness of the tsunami-created breeding grounds⁴.

The potential outbreaks in tsunami affected areas may be predominantly due to faeco-orally transmitted infections, mainly cholera⁵. Other factors that contribute to potential epidemics are faecal contamination of drinking water, breeding of houseflies with accumulation of garbage and scant regard to personal hygiene. In addition, overcrowding in the rescue camps, unaccustomed physical environment, confusion, loss of initiative and environmental sanitation⁵ create ideal conditions for such outbreak.

A sudden rise in fly density is possible in areas affected by natural disasters⁶. Flies live in close association with humans, the most important include the housefly family, with the genera *Musca*, *Fannia* and *Muscina*; the biting flies, *Stomoxys* (Family Muscidae); the blowflies, *Chrysomya*, *Calliphora* and *Lucilia*; and the flesh-flies, *Sarcophaga*⁷. *Musca domestica*, the housefly, is the most common species of fly found in close association with human being throughout the world. The reproductive potential of houseflies is phenomenal. Within six month of continuous breeding, if all adults survived in all progenies, would buildup

flies more than a trillion. It has been reported that the fermenting and putrefying organic materials attract flies and can get dispersed at a rate of >2-10 km/h⁸. The housefly, *M. domestica*, is not only a nuisance pest, but also acts as an important mechanical vector for many pathogenic microorganisms, mainly bacteria, protozoa, worms, fungi and viruses amongst humans and animals⁹. The transmission of the disease agents is mainly by means of different contaminated body parts such as hairs, legs and mouth parts⁹. It has been observed that about 33 million microorganisms may flourish in a single fly's gut, while half a million more swarm over its body and legs¹⁰. As reported by the WHO⁷, epidemics of shigellosis and diarrhoeal diseases can be common where high human and fly population densities are associated with unsanitary conditions, as may be found in refugee camps.

The study by Srinivasan *et al*¹¹ in this issue reported abundance of eight species of flies from tsunami affected coastal villages of southern India in which about 85 per cent were *M. domestica*. They also observed that the fly density in sea water incursion area was higher than seawater non incursion area. Although no much information is available on housefly abundance in India, high prevalence of houseflies was reported during two months of post-tsunami period from tsunami affected coastal villages where the predominant species contributing more than 78 per cent population of flies collected was *M. domestica*¹².

In the tsunami hit areas, the density of muscoid flies recorded immediately after the tsunami was 60-100 times higher and after a period of 12 months post-tsunami was 1-4 times higher, compared to tolerable levels reported by WHO¹¹. Such a high muscoid density can create a favourable environment for easy spread of pathogenic organisms, if any. Monitoring of houseflies is therefore important which not only bring the information on abundance of flies but also the pathogens carried by these. Being a potential carrier of many pathogenic organisms, study on vector potentiality of *M. domestica* collected from natural disaster affected area may reveal presence of pathogens, their strain variation as well as response to antibiotic sensitivity, which can be helpful in designing proper treatment against them. Fotedar¹³ while studying vector potentiality of housefly from cholera outbreak area of Delhi, recovered two strains of *V. cholerae* from *M. domestica*. Sulaiman *et al*¹⁴ also isolated 18 species of enteropathogenic bacteria

from different cyclorrhaphan flies from Malaysia indicating their ability to transmit a variety of pathogens.

Housefly prefers to breed in organic waste and garbage. The artificial garbage such as kitchen waste and mass supply of food were found to be mainly responsible for high fly density¹¹. Proper processing and disposal of refuse, manure, compost and other organic waste helps in the elimination of fly breeding sites⁷. As mentioned by Srinivasan *et al*¹¹, intensive efforts were made in the tsunami affected areas which effectively reduced the fly density, the main factors for those were reduction in accumulation of solid waste at centralized kitchens and relief camps, proper waste removal, spraying of dichlorvos and changing practice of open defaecation to use of toilets. Monitoring done one year after tsunami revealed comparable fly density in both incursion as well as non incursion areas indicating the restoration of normal situation¹¹.

This study confirm that flies are not only a nuisance but pose potentially serious health risks by mechanically transmitting pathogens and therefore need to be controlled by practicing different vector control approaches⁹. In emergency situations, where rapid insect population control is required, chemical control methods are most practical and are usually preferred. After tsunami, Director of Public Health employed spraying of dichlorvos at regular intervals for quick elimination of fly in tsunamis-hit coastal villages in south India. The toxicity data revealed that LD₉₀ values of the dichlorvos in flies collected from tsunami-hit villages were 3.5-3.9 times higher than that of wild caught flies collected from villages 100 km away from tsunami affected villages, suggesting that the flies collected from tsunami-hit villages had developed tolerance to dichlorvos¹⁵. Although many chemicals have been used to combat pest populations, unfortunately the hope of eradicating pests dissipated as several species developed resistance to many of these chemicals within a relatively short period¹⁶. An integrated approach for housefly control need to be designed to keep the fly populations below the tolerable level without ecological disturbance. The present report on lesser muscoid flies in tsunami-hit coastal villages of southern India one year after disaster suggests that the post-disaster relief efforts were mainly responsible for preventing occurrence of any control outbreak of any vector borne diseases.

Shri Prakash* & S.N. Tikar

Division of Entomology
Defence Research & Development Establishment
Defence Research & Development Organisation
Jhansi Road, Gwalior 474 002, India

*For correspondence:
shripra2004@yahoo.co.in

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