Special Feature: Commentary

Dengue outbreaks in India:will history keep on repeating itself?

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Dengue is caused by four flavivirus serotypes (DEN-1, DEN-2, DEN-3 and DEN-4). The incidence of dengue fever (DF) and dengue haemorrhagic fever (DHF) has increased thirty-fold globally in the last four decades. In developing nations like India, unplanned urbanization and migration of population from rural to urban areas with complete lack of proper sanitation facilities are important factors resulting in this situation.[1] 'Globalization' with rapid air travel has also exposed the developed nations to this disease.

The situation in our country is reflected by the occurrence of major disease outbreaks in India recent times.[2] However, no reliable data are available to assess the magnitude of the disease in our country. But, obviously, the situation is quite dismal. In the last few years, many major disease outbreaks of dengue have been reported in India.[3]

The major pathophysiological abnormality differentiating DF from DHF is the plasma leakage syndrome due to generalized vasculopathy (haemoconcentration, hypo-protein aemia and/or serous effusion). The severity of disease in DHF depends on the quantum of plasma leakage. It is important to appreciate that platelet count is not predictive of haemorrhage.[4] The patients of DHF with excessive plasma loss resulting in shock are labeled as dengue shock syndrome (DSS). DHF/ DSS are potentially fatal conditions if managed inappropriately.

Therefore, there is a need to sensitize the health care providers regarding the management principles of DF/DHF. All patients of DF do not need hospitalization. Oral rehydration therapy should be initiated on the first day of the illness in DF as it prevents DHF and decreases risk for hospitalization in these patients.[5] It will not be an exaggeration to state that appropriate hydration is the only therapeutic modality that makes the difference between life and death in a dengue patient.

However, dengue patients with warning signs need to be hospitalized. The two most important warning signs which should never be ignored are inability to maintain hydration due to persistent vomiting or abdominal pain and haemetemesis or melaena. In our country with very poor oral dental hygiene in most people, gum bleeding may occur even with mild thrombocytopenia and needs to be considered in proper perspective rather than cause 'panic'. The other warning sign is dizziness/vertigo on getting up from lying down position, reflecting postural hypotension.

The role of platelet transfusion as a panacea for the management of dengue needs special mention. Unfortunately, patients as well as health care workers tend to "*chase*" platelet counts due to proliferation of "computerized laboratories" with automated 'coulter' machines which give almost instant platelet results. Often, the platelet count is underestimated by these computerized machines if they are not manually cross- checked due to the clumping of platelets. In fact, most of these patients are recovering from DF i.e., Patients are afebrile, appetite is normal and have a feeling of well being, but the platelet count is on the "lower side". It needs to be re-emphasized that health care providers should not treat platelet count in dengue like 'sensex' of the share market i.e., An increase or decrease reflecting on the economy of the nation! The focus should be to treat excessive haemoconcentration by hydration and observe for overt bleeding (which is a danger sign irrespective of the platelet count). This "syndrome" of chasing platelet count in DF patients who are otherwise completely asymptomatic and improving can be labelled as "dengue panic syndrome".[6-8]

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Many times empirical platelet transfusions are being given to asymptomatic patients at platelet counts in the range of 30,000/mm^3 to 60,000/mm^3. We tend to forget that even in thrombocytopenia due to noninfectious aetiologies, the threshold for prophylactic platelet transfusion is 10,000/mm^3 in these patients. [9] This panic syndrome has been quite evident in the outbreak of DF in northern states of India in recent times. Therefore, the role of media in dissemination of correct knowledge will go a long way in easing the panic which is associated with dengue now. Inadvertent airing of 'views' of 'individuals' which are contrary to evidence-based medicine results in perpetuating the wrong myths about the disease.[6-8]

The flip side of the "dengue panic syndrome" is the overloading of the already strained emergency services of tertiary care hospitals by these patients. Consequently, the "true" DHF/DSS patients needing urgent attention in the emergency may not get the desired care, in spite of the best efforts of the hospital personnel.[10]

George Bernard Shaw once wrote *"We learn from history that we learn nothing from history"*. In our country, rather unfortunately, this is aptly reflected by the recurrent outbreaks of DF. Broadly, dengue virus thrives on three factors: mosquito, water and environmental temperature. Environmental temperature is something which is beyond our control. However, we can surely anticipate and tackle the water and mosquito combination on which dengue virus survives in the period September-October (optimal temperature) every year during monsoon season in our country.

Obviously, the core strategy for the reduction in transmission of dengue is the role of community participation and municipal machinery in vector control. Unfortunately, there is no concerted effort to prevent mosquito breeding. *Aedes aegypti* feeds during the day, rests indoors and lays its eggs in artificial water containers. Therefore, vector control includes simple measures like eliminating larval habitats, using insect repellents/indoor space-spray insec-ticides/out door fogging and mosquito nets for children while sleeping.

In fact, in India we need a national 'awakening' program about the sanitation and garbage disposal which result in many infectious diseases like malaria, hepatitis, diarrhea to name a few, besides dengue. The latest to join this notorious 'bandwagon' is Chikungunya fever (similar clinical features like dengue, but less life-threatening) reported in South India. Surely, once we start looking for Chikungunya fever in North India, we will be able to document it as the vector is the same *Aedes* mosquito.

We have to give a clarion call and declare a 'war' to clean the cities and villages. As the fear of dengue looms over all of us, it can be used as an effective foundation to change the mindset of people regarding cleanliness and proper garbage disposal and its health benefits. The municipal authorities have to take this as a challenge to be realized in a time-bound schedule. Otherwise, we end with lot of 'planning' in India, but our 'implementation' is most of the times sloppy resulting in these outbreaks. Hopefully, with the judiciary also becoming proactive in this, things should improve in the long run. The media of course has to highlight the advantages of this cleanliness drive with the same zeal.

The other important strategy is to incorporate science while planning our public health policies. The widespread use of chemical insecticides over the years has exposed *Aedes* mosquito to an intense selection pressure of resistance against these compounds. Therefore, programs will have to be designed to monitor the resistance of *Aedes aegypti* to insecticides in our country. In fact in India we need to concentrate on vector surveillance of not only dengue but also malaria to prevent future outbreaks of these diseases.

The change in serotypes underscores the role of viral genetic turnover within a focal population and the potential importance of adaptive evolution in viral epidemic expansion. Different serotypes have been observed in 1996 (DEN-2) and 2003 (DEN-3 and 2) outbreaks in north India. The outbreak in 2006 has been mainly due to DEN-3 serotype and perhaps resulted in relatively less mortality compared to 1996 outbreak. In fact, the mortality

observed in 1996 was far greater than the recent outbreak and possibly can be explained by the difference in the serotypes (DEN-2 is more virulent than DEN-3).[13]

It has also been suggested that *Aedes aegypti* tends to be more susceptible to infection by DEN-2 virus of South-East Asian genotype as compare to American genotype.[12] These observations obviously have important epidemiological implications for Asian countries as the local vector has increased propensity to transmit dengue infection, especially DEN-2 (relatively more virulent serotype).

In fact, there is an urgent need for randomized control led clinical trials in our country where one arm receives hydration only and the other arm receives platelet transfusion. There can be multiple arms with different cut-off values at which platelets are transfused. The results can be analyzed for difference in mortality in various subgroups. We need to emulate the smaller developing countries like Vietnam who have already taken a lead in this direction.[13] India needs to prioritize its research areas so that our response is not knee jerk in infectious disease out breaks.

Either we have to control the vector of the disease or we need to devise an evidence-based therapeutic strategy for the unfortunate victims of this easily preventable scourge. No nation can be "wealthy" without a "healthy" population and all our policies need to be oriented to lead the country in the correct direction. As it is said *"Where there is a will, there is a way"*- what we need in India is an honest will to achieve this.

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