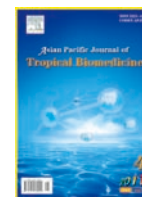




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Concurrent malaria and dengue infection: a brief summary and comment

Viroj Wiwanitkit

Wiwanitkit House, Bangkok, Bangkok Thailand 10160

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ABSTRACT

There are several tropical mosquito borne infections. Malaria and dengue are the two common mosquito infections that are very important and cause high morbidity and mortality for many patients around the world. Concurrent malaria and dengue infection is an important condition that is seldom reported. In this specific article, the author hereby summarizes on the topic of concurrent malaria and dengue infection.

1. Introduction

Mosquito is considered to be an important animal vector that can cause several diseases to human beings. Mosquito-borne infectious disease is accepted as important tropical infections and is the focused topic in tropical medicine^[1–3]. There are several tropical mosquito borne infections. Malaria and dengue are the two common mosquito infections that are very important and cause high morbidity and mortality for many patients around the world. Concurrent malaria and dengue infection is an important condition that is seldom reported. In this specific article, the author hereby summarizes on the topic of concurrent malaria and dengue infection.

2. What is the concurrent malaria and dengue infection?

In general, malaria is a protozoa infectious^[4–6]. The pathogen is one of five human pathogenic species of *Plasmodium*. The main mosquito vector is *Anopheles*. Whereas dengue is a viral infection^[7–9]. The pathogen is dengue virus. The main mosquito vector is *Aedes*. Both diseases can cause acute febrile illness. However, malaria can be chronic while dengue cannot. The specific triads of dengue, atypical lymphocytosis, hemoconcentration and

thrombocytopenia might be a clue for differential diagnosis of dengue infection from other tropical infections including to malaria^[7–9].

It is no doubt that in a tropical country, the high prevalence of malaria and dengue can be seen. However, concurrent malaria and dengue infection is not common. Concurrent malaria and dengue infection is a scenario that both malaria and dengue exists in a patient at the same time.

3. Nature of concurrent malaria and dengue infection

There are few published reports on concurrent malaria and dengue infection. Reports are from only some countries^[10–17]. Of interest, some areas with high prevalence of both malaria and dengue such as those countries in Southeast Asia have never reported any cases of concurrent malaria and dengue infection.

According to the report by Carme *et al* in French Guiana, the specific rate of concurrent malaria and dengue infection from overall febrile patients was equal to 0.99%^[12]. Based on this report, it can assume that there is a high chance of concurrent infection in this setting. Focusing on the clinical presentations, the common manifestations of concurrent malaria and dengue infection include high fever and myalgia^[10–17]. Characteristics of concurrent malaria and dengue infections are shown in Table 1. There is no specific report on the modification of the nature of morbidity and mortality in co-infection^[10–17]. No report is on the increased severity of disease comparing to each infection^[10–17]. In addition, there is no recommendation for any specific

*Corresponding author: Professor Viroj Wiwanitkit, M.D., Wiwanitkit House, Bangkok, Bangkok Thailand 10160.
Tel: 6624132436
E-mail: wiroj@yahoo.com

required treatment for co-infection. The combination of separated therapeutic protocol for each infection at the same time can be successful^[10–17]. Focusing on the species of malaria, any species of malaria can co-infect with dengue.

Based on these observations, the concurrent malaria and dengue infection is only a co-infection that has no significant alternative effect on each separated infection.

Table 1
Characteristics of concurrent malaria and dengue infection.

Characteristics	Malaria infection	Dengue infection	Concurrent infection
Mode of transmission	Mosquito borne (<i>Anopheles</i>)	Mosquito borne (<i>Aedes</i>)	Mosquito borne (<i>Anopheles</i> + <i>Aedes</i>)
Fever	Acute febrile illness (chronic in some cases)	Acute febrile illness	Acute febrile illness
Myalgia	Detectable	Common	Common
Shock	Possible	Possible	Possible
Blood parasite	Positive	Negative	Positive
Atypical lymphocytosis	Usually negative	Usually positive	Usually positive
Hemoconcentration	Usually negative	Usually positive	Usually positive
Thrombocytopenia	Usually negative	Usually positive	Usually positive
Bleeding	Rare	Possible	Possible
Hemolysis	Possible	Rare	Rare
Tourniquet test	Usually negative	Usually positive	Usually positive
Treatment	Antimalarial drug	Fluid therapy	Antimalarial drug with fluid therapy

4. Why concurrent malaria and dengue infection is not common?

This is a simple question to be clarified. Indeed, as noted, malaria and dengue are both common infection in the tropical countries. However, the concurrent infection is not often reported. The possible explanations include:

1. Each infection has each specific mosquito vector. However, the mosquito vector for each infection has different habitat. Malaria mosquito vector has the main habitat in the forest^[18] while dengue mosquito vector has the main habitat in the city^[19]. Hence, overlapping of the habitat cannot be easily available.
2. The immunity to each infection in the endemic area is probable. Hence, this immune function might prevent for the infection^[20].
3. Co-infection has to be by chance. This means each infection has its specific chance of infection. Simply, this can be explained as the prevalent rate of each infection in each setting. Based on mathematical probability principle, the prevalent rate or chance of current infection is the result from multiplication of the specific rate of malaria by the specific rate of dengue. Hence, the significant lower resulted concurrent rate can be expected.
4. In addition, when one has acute febrile illness, some might not visit to the physician and self limitation and turning into recovery (in dengue) or carrier status (in malaria) can be expected in some cases.
5. Finally, the concurrent infection can be easily forgotten. When a disease can be diagnosed in acute febrile illness, the concern on the existence of other infections is usually not taken. Although there is no additional severity due to concurrent infection the under-diagnosis of one infection

means the complete success in treatment for the concurrent infection cannot be gotten^[17].

Conflict of interest statement

We declare that we have no conflict of interest.

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