THE MONTHLY CHANGING OF THE LOWEST POPULATION DENGUE VIRUS INFECTION IN PATIENT AT SOERYA HOSPITAL SIDOARJO IN 2010

Soegeng Soegijanto[1,2], Budiyanto[2], Kartika[2], Taufik[2], Amor[2]
[1] Institute of Tropical Disease
[2] Pediatric Department of Medical School Airlangga University
Surabaya, Indonesia

ABSTRACT

Background: Dengue virus infection is one of the important health problems in Indonesia, although the mortality rate has been decreased but many dengue shock syndrome cases is very difficult to be solving handled. To solve this problem, some factor that influence the prevalence of dengue virus infection should be studied. The Aim of Study: To detect some factor that maintain the higher case of dengue virus infection in patient at the Soerya Hospital Sepanjang, Sidoarjo. Material & Method: Study had been done at Soerya Hospital Sepanjang, Sidoarjo since January 1, 2007 until December 31, 2010. All cases suspected dengue virus infection in patient at soerya hospital were diagnosed based on WHO criteria in 1997 and PCR examination in ITD laboratory. The Result: In 2007, 2008, 2009, the monthly observation showed that decreasing cases of dengue virus infection in patient at Soerya Hospital had been found on September, but in 2010 this event had been found on November. Why this event to be change? It is suggested might be due to global warming in the world and the climate going to influence the environment sanitation. Interaction between agent host and environment becoming increase it might be due to the changing of climate can influence the growing population Aedes Aegyptie and Aedes Albopictus promoting to increase vector for transmit dengue virus infection. It is prominent in sub urban area, with have many peoples don't aware with the bad environment sanitation. And many peoples showed very dynamic for living until the idea good environment do not be thought. By this condition the monthly population dengue virus infection in patient at hospital are going to maintain higher more than six months than usually. On the year 2007, 2008, 2009 the lowest cases found on September. In 2010, the lowest cases had been found on November. The Conclusion: Global warming, increasing sub urban area which have many peoples don't aware with the bad environment sanitation and have highly dynamic peoples for getting some money for their life, could influence the higher cases dengue virus infection in patient at hospital more than 6 months.

Key words: *Monthly changing, dengue virus infection, in patient, in 2010*

INTRODUCTION

Epidemic dengue is a major public health problem in Indonesia, which is tropical mansoon and equatorial zone. Where Aedes Aegypti is wide spread in both urban and rural area where multiple virus serotype are circulating and where dengue is a leading cause of hospitalization and death in children. Cycle epidemic are increasing in frequency and in country geographic expansion is occurring in the dry and wet climate zone with multiple virus serotype circulating.

Dengue inflicts a significant health, economic and social burden on the populations of endemic areas. Globally the estimated number of disability adjusted life years (DALYs)

lost to dengue in 2001 was 528. The number of cases reported annually to WHO ranged from 0.4 to 1.3 million in the decade 1996–2005. As an infectious disease, the number of cases varies substantially from year to year. Underreporting and misdiagnoses are major obstacles to understanding the full burden of dengue.

On average, a hospitalized case of dengue cost three times what an ambulatory case costs. Combining the ambulatory and hospitalized patients and factoring in the risk of death, the overall cost of a dengue cases is US$ 828. Children are at a higher risk of severe dengue. Intensive care is required for severely ill patients, including intravenous fluids, blood or plasma transfusion and medicines. Dengue

afflicts all levels of society but the burden may be higher among the poorest who grow up in communities with inadequate water supply and solid waste infrastructure, and where conditions are most favourable for multiplication of the main vector, Aedes Aegypti. Travelers play an essential role in the global epidemiology of dengue infections, as viraemic travelers carry various dengue serotypes and strains into areas with mosquitoes that can transmit infection.

Over the past four years, epidemic dengue activity has spread in Indonesia which more than 35% of country's population lives in urban areas 150.000 cases were reported in 2007 with over 250.000 cases reported from Jakarta, West Java and East Java. The case fatality rate was approximately 1%.

This paper as a part of overview epidemiology dengue in sub urban area of Sidoarjo residence with presented data Dengue cases at Soerya hospital in 2007, 2008, 2009, and 2010.

THE AIM OF STUDY

To detect some factor that maintain the higher case of Dengue virus infection in patient at the Soerya Hospital Sepanjang Sidoarjo.

MATERIAL AND METHOD

Study had been done at Soerya Hospital since January 1, 2007 until December 31, 2010. Diagnoses cases suspected Dengue virus infection in patient at Soerya hospital had been based on WHO criteria 1997 and PCR examination in ITD labolatory.

THE RESULT

In 2007–2009 the monthly observation to Dengue virus infection showed that the decreasing cases of Dengue virus infection in patient at Soerya hospital had been found on September, but in 2010 this even had been found in November (see table 1 & figure 1).
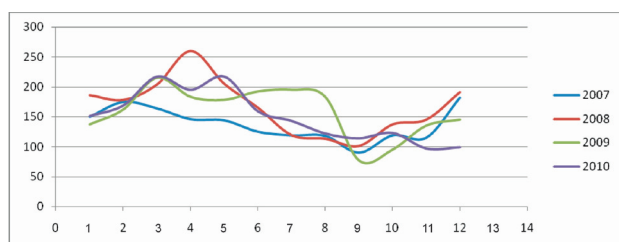

Figure 1. The monthly cases of Dengue virus infection which had been in patien at Soerya hospital in 2007–2010

Table 1. The monthly Dengue virus infection cases in 2007-2010

No.	Month	Year			
		2007	2008	2009	2010
1	Januari	150	186	137	151
2	Februari	175	178	162	169
3	Maret	164	204	215	217
4	April	146	260	183	195
5	Mei	144	205	178	217
6	Juni	125	165	192	159
7	Juli	119	119	195	143
8	Agustus	118	113	183	122
9	September	90	101	77	114
10	Oktober	119	137	95	123
11	Nopember	115	145	135	97
12	Desember	182	191	145	99
Total		1647	2004	1897	1806

The higher prevelancy of dengue virus infection might be due too:
a) The environment sanitation surrounding their house is not enough qualified because the pollution of the factory every day (every early morning and midnight) has been thrown out surrounding the community.
b) The cleaning water is very difficult to get an usually has been contaminated with microbiology.
c) Many people who live in sub urban area with crowded families.

DISCUSSION

The climate changing due to global warming make many cleaner pocked water which are going to spred many parts. Such as at surrounding houses, school, and some found in the field. It support to increase population many mosquito Aedes Aegypti and Aedes Albocpitus if the breeding season of this mosquito occur, there are many larvaes found in pocked water area and in short time it become adult mosquito and do as vector Dengue infections transmit virus from one case Dengue virus infection to other cases who live in surrounding it. Many cases of Dengue virus infection will be increased (see table 1 & figure 1).

This paper focused in Dengue virus infection, Dengue has a wide spectrum of clinical presentations, often with unpredictable clinical evolution and outcome. While most patients recover following self limiting non-severe clinical course, a small proportion progress to severe disease, mostly characterized by plasma leakage with or without haemorrhage. Intravenous rehydration is the therapy of choice; this intervention can reduce the case fatality rate to less than 1% of severe cases. The group progressing from non-severe to severe disease is difficult to define, but this

is an important concern since appropriate treatment may prevent these patients from developing more severe clinical conditions.

Triage, appropriate treatment, and the decision as to where this treatment should be given (in a health care facility or at home) are influenced by the case classification for dengue. This is even more the case during the frequent dengue outbreaks worldwide, where health services need to be adapted to cope with the sudden urgent in demand.

Changes in the epidemiology of dengue, as described in the previous sections, lead to problems with the use of the existing WHO classification. Symptomatic dengue virus infections were grouped into three categories: undifferentiated fever, dengue fever (DF) and dengue haemorrhagic fever (DHF). DHF was further classified into four severity grades, with grades III and IV being defined as dengue shock syndrome (DSS). There have been many reports of difficulties in the use of this classification, which were summarized in a systematic literature review. Difficulties in applying the criteria for DHF in the clinical situation, together with the increase in clinically severe dengue cases which did not fulfill the strict criteria of DHF, led to the request for the classification to be reconsidered. Currently the classification into DF/DHF/DSS continues to be widely used.

A WHO/TDR supported prospective clinical multicentre study across dengue endemic regions was set up to collect evidence about criteria for classifying dengue into levels of severity. The study findings confirmed that, by using a set of clinical and/or laboratory parameters, one sees a clear cut difference between patients with severe dengue and those with non severe dengue. However, for practical reasons it was desirable to split the large group of patients with non severe dengue into two subgroups patients with warning signs and those without them. Criteria for diagnosing dengue (with or without warning signs) and severe dengue should follow guidelines for diagnosis, treatment, prevention and control (new edition WHO 2009). It must be kept in mind that even dengue patients without warning signs may develop severe dengue.

Expert consensus groups in Latin America (Havana, Cuba, 2007), South-East Asia (Kuala Lumpur, Malaysia, 2007), and at WHO headquarter in Geneva, Switzerland in 2008 agreed that: "dengue is one disease entity with different clinical presentations and often with unpredictable clinical evolution and outcome".

The classification into levels of severity has a high potential for being of practical use in clinicians decision as to where and how intensively the patient should be observed and treated (i.e. triage, which is particularly useful in outbreaks), in more consistent reporting in the national and international surveillance system, and as an end-point measure in dengue vaccine and drug trials.

In 2007–2008–2009 we had found many cases with unusually clinical manifestation of dengue hemorrhagic fever. Some of them showed a clinical manifestation that could not predict as usually cases DHF; schedule severity

and recovery becoming prolong until ten days. Especially for cases with obesity and severe malnutrition. It may be due to decreasing immunity for doing immune respond reaction. Beside it there were cases showed prolong fever more than seven days. We should aware with a concident infection such as typhoid fever that can be identified with the result positive IgM Salmonella in the blood.

The other cases should be in mind; the underlying disease like as Tuberculosis and urinary tract infection that making the time recovery become prolong.

Dengue virus is a small single stranded RNA virus comprising four distinct serotypes. These related serotypes of the dengue virus belong to the genus flavivirus, family Flaviviridae.

The mature particle of the dengue virus is spherical with a diameter of 50 nm containing multiple copies of the three structural proteins, a host derived membrane bilayer and a single copy of a positive sense, single stranded RNA genome. The genome is cleaved by host and viral proteases in three structural proteins (capsid, C, prM, the precursor of membrane, M, protein and envelope, E) and seven nonstructural proteins.

Distinct genotypes or lineages (viruses highly related in nucleotide sequence) have been identified within each serotype, highlighting the extensive genetic variability of the dengue serotypes. Purifying selection appears to be a dominant theme in dengue viral evolution, however, such that only viruses that are "fit" for both human and vector are maintained. Among them, "Asian" genotypes of DEN2 and DEN3 are frequently associated with severe disease accompanying secondary dengue infections. Intra host viral diversity (quasispecies) has also been described in human hosts.

In 2009 Yamanaka has found dengue virus D1 stereotype IV which showed a severe clinical performance coincidence with primary dengue virus infection.

The various serotypes of the dengue virus are transmitted to humans through the bites of infected Aedes mosquitoes, principally Ae. Aegypti. This mosquito is a tropical and subtropical species widely distributed around the world, mostly between latitudes 35° N and 35° S. these geographical limits correspond approximately to a winter isotherm of 10° C Ae. Aegypti has been found as a far north as 45° N, but such invasions have occurred during warmer months and the mosquitoes have not survived the winters. Also, because of lower temperatures, Ae. Aegypti is relatively uncommon above 1000 metres. The immature stages are found in waterfilled habitats, mostly in artificial containers closely associated with human dwellings and often indoors. Studies suggest that most female Ae. Aegypti may spend their lifetime in or around the houses where they emerge as adults. This means that people, rather than mosquitoes, rapidly move the virus within and between communities. Dengue outbreaks have also been attributed to Aedes Albopictus, Aedes Polynesiensis and several species of the Aedes Scutellaris complex. Each of these species has a particular ecology, behavior and geographical

distribution. In recent decades Aedes Albopictus has spread from Asia to Africa, the Americas and Europe, notably aided by the international trade in used tyres in which eggs are deposited when they contain rainwater. The eggs can remain viable for many months in the absence of water.

After an incubation period of 4–10 days, infection by any the four virus serotypes can produce a wide spectrum of illness, although most infection asymptomatic or subclinical (chapter 2). Primary infection is thought to induce lifelong protective immunity to the infecting serotype. Individuals suffering an infection but with no long term cross protective immunity.

Individuals risk factor determine the severity of disease and include secondary infection, age, ethnicity and possibly chronic disease (bronchial asthma, sickle cell anemia and diabetes mellitus). Young children particular may be less able than adults to compensate for capillary leakage and are consequently at greater risk of dengue shock.

Seroepidemiological studies in studies in Cuba and Thailand consistently support the role of secondary heteritypic infection as a risk factor for severe dengue, although there are a few report of severe cases associated with primary infection. The time interval between infection and the particular viral sequence of infection may also be of importance. For instance, a higher case fatality rate was observed in Cuba when DEN-2 infection followed a DEN-1 infection after an interval 20 years compared to an interval of four years. Severe dengue is also regularly observed during primary infection of infant born to dengue immune mothers. Antibody-dependent enhancement (ADE) of infection has been hypothesized as a mechanism to explain severe dengue in the course of a secondary infection and in infants with primary infections. In this model, neo neutralizing, cross reactive antibodies raised during a primary infection, or acquired passively at birth, bind to epitopes on the surface of a heterologous infecting virus and facilitate virus entry into Fc-receptor-bearing cells. The increased number of infected cells is predicted to result in a higher viral burden and induction of a robust host immune response that includes inflammatory cytokines and mediators, some of which may contribute to capillary leakage. During secondary infection, cross reactive memort T cells are also rapindly activated, proliferate, express cytokines and die by apoptosis in amanner that generally correlates with overall disease severity. Host genetic determinants might influence the clinical outcome of infection, throught most studies have been unable to adequately addres this issue. Studies in America region show the rates of severe dengue to be lower in individuals of Africans ancestry than those in other ethnicgroups.

The dengue virus enters via the skin while an infected mosquito is taking a bloodmeal. During the acute phase of illness the virus is present in the blood and its clearancefrom this compartment generally coincides with defervescence. Himoral and cellularimmune response are considered to contribute to virus clearance via the generation of neutralizing antibodies and the activation of CD 4 and CD 8 T lymphocyte. In addition, innate host defense may limit infection by the virus. After infection, serotype specific and cross reactive antibodies and CD 4 and CD 8 T cells remain measurable for years.

Plasma leakage, haemoconcentration and abnormalities in homeostasis characterize severe dengue. The mechanism leading to severe illness are not well defined but the immune response, the genetic background of the individual and the virus characteristic may all contribute to severe dengue.

Recent data suggest that endothelial cell activation could mediate plasma leakage. Plasma leakage is thought to be associated with fuctional rather than destructive effect on endothelial cell. Activation of infected monocytes and T cells, the complement system and the production of mediators, monokines, cytokines and soluble receptors may also be involved in endhotyal cell dysfunction.

Thrombocytopenia may be associated with alterations in megakaryocytopoises by the infection of human haematopoietic cells and impaired progenitor cell growth, resulting in platelet dysfunction (platelet activation and aggregation), increased destruction or consumption (peripheral sequestration and consumption). Haemorrhage may be a consequence of the thrombocytopenia and associated platelet dysfunction or disseminated intravascular coagulation. In, summary a transient and reversible imbalance of inflammatory mediators, cytokinesiss and chymokinesis occurs during severe dengue, probably driven by a high early viral burden and leading to dysfunction of vascular endothelial cell, derangement of the haemocoagulation system then to plasma leakage, shock, bleeding.

Humans are the main amplifying host of the virus. Dengue virus circulating in the blood of viraemic humans is ingested by female mosquitoes during feeding. The virus then infects the mosquito mid-gun and subsequently spreads systemically over a period of 8–12 days. After this exstrinsic incubation period, the virus can be transmitted to others human during subsequent probing our feeding. The extrinsic incubation period in influence in part by invironmental conditions, especially ambient temperature. Thereafter the mosquito remains infective for the rest of its life. Aedes Aegypti is one of the most efficient vectors for arboviruses because it is highly antrophopilic, frequently bites several times before completing oogenesisi and thrives in close proximity to humans. Vertical transmission of dengue virus has been demonstrated in the laboratory but rarely in the field. The significance of vertical transmission for maintenance of the virus is not well understood. Sylvatic dengue strains in some parts of Africa and asia may also lead to human infection, causing mild illness. Several factors can influence the dynamics of virus transmission including environmental and climate factors, host-pathogen interaction and population immunological factors. Climate directly influences the biology of the vectors and thereby their abundance and distribution it is consequently an important determinant of vector borne disease epidemics.

This overview had also found in our experience in 2007, 2008, 2009, 2010 as follow: The Dengue virus infection cases were one of the top ten infection diseases it had been found at Soerya Hospital in 2007, 2008, 2009 and 2010.

In 2007, 2008, 2009, the monthly observation showed that decreasing cases of dengue virus infection in patient at Soerya Hospital had been found on September, but in 2010 this event had been found on November.

Why this event to be change? It is suggested might be due to global warming in the world and the climate going to influence the environment sanitation. Interaction between agent host and environment becoming increase it might be due to the changing of climate can influence the growing population Aedes Aegyptie and Aedes Albopictus promoting to increase vector for transfering dengue virus infection. It is prominent in sub urban area, with have many peoples don't aware with the bad environment sanitation. And many peoples showed very dynamic for living until the making good environment do not be thought. By this condition the monthly population dengue virus infection in patient at hospital are going to maintain higher more than six months than usually. On the year 2007, 2008, 2009 the lowest cases found on September. In 2010, the lowest cases had been found on November.

CONCLUSION

Dengue inflicts a significant health, economic and social burden on the population of endemic area. Under reporting and mis-diagnosis are major obstacl to understanding the full burden of dengue. Travelers play on an essential role in the global epidemiology of dengue infection as viremia traveler carry various dengue serotypes and strain into areas with mosquitoes that can transmit infection.

Over the past four years, epidemic dengue activity has spread in Indonesia. This paper as a part of overview epidemiology dengue in sub urban area. Presented data dengue that included in the top ten Tropical disease cases at Soerya Hospital in 2007, 2008, 2009, and 2010.

Global warming; increasing sub urban area which have many peoples don't aware with the bad environment sanitation and have highly dynamic peoples for getting some money for their life, could influence the higher cases dengue virus infection in patient at hospital more than 6 months.

REFERRENCES

1. Torres EM. Dengue. Estudos Avancados 2008; 22(64): 22–52.
2. Guzman MG, Kouri G. Dengue diagnosis, advances and challenges. Int J Infect Dis 2004; 8: 69–80
3. World Health Organization. Dengue: guidelines of diagnosis, treatment, prevention and control-new edition. Geneva: WHO, 2009.
4. Malavige GN, Fernando S, Fernando DJ, et al. Dengue viral infections. Postgrad Med J 2004; 80: 588–601.
5. Martinez E. dengue. In: Gonzalez-Saldana N. etal. (ed.) Infectologia clinica pediatrica. Mexico, DF: Editorial Trillas, 1997: p.589–95.
6. World Health Organization. Dengue haemorrhagic fever: diagnosis, treatment and control. 2nd edition. Geneva: WHO, 1997: p.17–27.
7. Wills B. Janisch T. 2007. DENCO-current state of play. Available from http://conganat.sld.cu/instituciones/ipk/memorias/dengue2007/conf/wills-b2.pdf. [Cited on November 28th 2008.]
8. Seneviratnea SL, Malavige GN, de Silva HJ. Pathogenesis of liver involvement during dengue viral infections. Transactions of the Royal Society of Tropical Medicine and Hygiene 2006; 100: 608–14.
9. Abdul Wahid SFS, Sanusi S, Zawawi MM, Azman Ali R. Comparison of the pattern of liver involvement in dengue hemorrhagic fever with classic dengue fever. Southeast Asian J Trop Med Public Health 2000; 31: 259–63.
10. De Souza L, Carneiro H, Filho J, De Sauza T, Cortez V, Neto C, et al. Hepatitis in dengue shock syndrome. Braz J Infect Dis 2002; 6: 322–7.
11. Subramanian V, Shenoy S, Joseph A. Dengue hemorrhagic fever and fulminant hepatic failure. Digest Dis Sci 2005; 50: 1146–7.
12. Lawn S, Tilley R, Lloyd G, Tolley H, Newman P, Rice P. Dengue hemorrhagic fever with fulminant hepatic failure in an immigrant returning to Bangladesh. Clin Infect Dis 2003; 37: 1–4.
13. Lam SK. Dengue Infections with central nervous system manifestations. Neurol J Southeast Asia 1996; 1: 3–6.
14. Wali JP, Biswas A, Chandra S, et al. Cardiac involvement in Dengue Hemorrhagic Fever. Int J Cardiol 1998; 64: 31–6.
15. Promphan W, Sopontammarak S, Preukprasert P, Kajornwattanakul W, Kongpattanayothin A. Dengue Myocarditis. Southeast Asia J Trop Med Public Health 2004; 35(3): 611–3.
16. Lateef A, Fisher DA, Tambyah PA. Dengue and relative bradycardia. Emerging Infectious Diseases 2007; 13(4): 650–1.
17. Obeysekara I, Yvette H. Arbovirus heart disease. Myocarditis and cardiomyopathy following gangue fever and chickengunya fever. A follow up study. Am Heart J 1973; 85: 186–94.
18. Arif SM, Ahmed H, Khokon KZ, Azad AK, Faiz MA. Dengue haemorrhagic fever with bradycardia. J Medicine 2009; 10: 36–7.
19. Nair VR, Unnikrishnan D, Satish B, Sahadulla MI. Acute renal failure in dengue fever the absence of bleeding manifestations or shock. Infect Dis Clin Pract 2005; 13: 142–143.
20. Chaivisuth A. Renal involvement in dengue infection. Thai Pediatric Journal 2005; 12(3): 261.
21. Vasanwala FF, Puvanendran R, Ng JM, Suhail SM. Two cases of self-limiting nephropathies secondary to dengue haemorrhagic fever. Singapore Med J 2009; 50(7): e253–5.
22. Batra P, Saha A, Vilhekar K, Chaturvedi P, Thampi S. Dengue fever in children. J MGMIS 2006; 11: 13–8.
23. Gubler D. Dengue and dengue hemorrhagic fever. Clin Microbiol Rev 1998; 11: 480–96.
24. Shu P, Huang J. Current advances in dengue diagnosis. Clin Diag Lab Immunol 2004; 11: 642–50.
25. Malavige G, Fernando S, Fernando D, Seneviratne S. Dengue viral infection. Postgrad Med J 2004; 80: 588–601.
26. Lei H, Yeh T, Liu H, Lin Y, Chen S, Liu C. Imunopathogenesis of dengue virus infection. J Biomed Sci 2001; 8: 377–88.