

DHF cases dominated by Den-3 serotype in the West Java province

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Abstrak

Latar belakang: Jawa Barat merupakan salah satu propinsi endemis DBD di Indonesia, tetapi data tentang distribusi serotipe di Jawa Barat masih terbatas pada daerah tertentu dengan kurun waktu yang berbeda. Pada tahun 2000-2002 serotipe Den-2 mendominasi di Kota Bandung. Tujuan dari penelitian ini adalah untuk mengetahui distribusi serotipe virus Dengue di Propinsi Jawa Barat dan serotipe yang mendominasi pada kasus DBD.

Metode: Pengumpulan data dilaksanakan selama bulan Oktober-Desember 2008 di 27 rumah sakit di Propinsi Jawa Barat. Populasi dalam penelitian ini adalah semua penderita yang didiagnosis terinfeksi virus dengue yang dirawat di 27 rumah sakit. Pemilihan sampel secara purposif yaitu penderita yang didiagnosis terinfeksi virus dengue yang bersedia berpartisipasi untuk selanjutnya dilakukan pemeriksaan imunologi. Penderita yang hasil pemeriksaan imunologinya positif diambil serumnya guna pemeriksaan serotipe virus dengue. Pemeriksaan serotipe virus dengue pada sampel serum dilakukan di Pusat Biomedis dan Teknologi Dasar Kesehatan Badan Litbangkes RI dengan menggunakan nested RT-PCR.

Hasil: Dari 513 sampel yang diperiksa, sampel yang dapat teridentifikasi serotipe virus Dengue adalah sebanyak 180 sampel. Sisanya tidak ditemukan adanya virus dengue dalam serum. Terdapat empat sampel yang menunjukkan adanya infeksi ganda 2 serotipe virus Dengue. Keempat serotipe ditemukan di Propinsi Jawa Barat. Dari keseluruhan sampel yang positif, Den-3 merupakan serotipe yang paling banyak muncul yaitu sebanyak 47,8%, disusul Den-2 (26,0%), Den-1 (18,6%), Den-4 (5,4%) dan Mix (2,2%). Den-3 ditemukan di semua daerah endemis di Propinsi Jawa Barat.

Kesimpulan: Keempat serotipe virus dengue di temukan Propinsi Jawa Barat yang didominasi serotipe Den-3. (*Health Science Indones 2012;1:23-6*)

Kata Kunci: serotipe den-3, distribusi serotipe virus dengue, dominansi serotipe

Abstract

Background: Although West Java is one of the endemic provinces for DHF in Indonesia, data on the distribution of serotypes in the province is still very limited to specific areas within different time periods. In 2000 – 2002, the serotype Den-2 dominated the Bandung city area. The purpose of this study was to identify the distribution of dengue virus serotype in the West Java province and the dominant serotypes in DHF cases.

Methods: Data was collected in October-December 2008 from 27 hospitals in the West Java province. The population for this study was all patients diagnosed with dengue virus hospitalized in the 27 hospitals. Sample was purposively chosen from these patients who were willing to participate in further immunologic examinations. Serum from patients who were immunologically positive was further examined to determine the dengue virus serotype. This examination was done in the Biomedical and Basic Health Technology Center of the Health Research and Development Unit Republic of Indonesia using the nested RT-PCR method.

Results: Out 513 samples examined, 180 samples could be identified. Dengue virus was not found in the rest of the samples. Four samples showed multiple infections of 2 dengue virus serotypes. All four serotypes were found in the West Java province. In all positive samples, Den-3 was found to be the dominant serotype with 47.8%, followed by Den-2 (26.0%), Den-1 (18.6%), Den-4 (5.4%), and mixed (2.2%). Den-3 was found in all endemic areas of the West Java province.

Conclusion: All 4 dengue virus serotypes can be found in the West Java province with Den-3 serotype the most dominant. (*Health Science Indones 2012;1:23-6*)

Keywords: den-3 serotype, dengue virus serotype distribution, serotype dominance

The morbidity rates for Dengue Hemorrhagic Fever (DHF) as reported by many countries are varied. Several factors may be the reason, such as age of the population, the vector density, the distribution of dengue virus, the prevalence of dengue virus serotype, and the weather conditions.¹ WHO has classified Indonesia as a country with high DHF endemicity. The high number of DHF cases in Indonesia is facilitated by the presence of all 4 dengue virus serotypes circulating in Indonesia.²

Data from many countries have stated that each dengue virus serotypes will trigger an epidemic depending upon different geographical conditions and time period.³ All four dengue virus serotypes can be found in Indonesia, but the most predominant are the Den-3 and Den-2 serotypes. All four serotypes have been identified in major cities in Indonesia.⁴

West Java is one of the DHF endemic provinces in Indonesia. There has been an increase in the number of DHF cases in West Java in the last five year. During the first quarter of 2006, there were 11,175 cases of DHF with 126 deaths (CFR 10.72%). Since 2007, all districts/cities in the West Java province have reported on outbreak/increased occurrences (*kejadian luar biasa, KLB*) of DHF.⁵ The data on the distribution of serotype in the West Java province are limited to specific regions only and different periods of time with varying results. The results of an epidemiologic study on Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF) in 2000-2002 of adults in the city of Bandung found that during that period of time all four dengue virus serotypes were detected with Den-2 the most dominant serotype.⁶ The purpose of this study was to identify the distribution of dengue virus serotype in the West Java province and the dominant serotypes in DHF cases.

METHODS

Data collection was done from October-December 2008 in 27 hospitals in the West Java province. The population for this study was all patients diagnosed with dengue virus hospitalized in the 27 hospitals.

Sample was purposively chosen from these patients who were willing to participate in further immunologic examinations. Serum from patients who were immunologically positive was were obtained and further examined to determine the dengue virus serotype.

The examination on dengue virus serotype was done in the Biomedical and Basic Health Technology Center of the Health Research and Development Unit Republic of Indonesia using the nested RT-PCR method.

The primer used in this study followed the method published by Lanciotti et al.⁷

The data obtained were analyzed descriptively to show the distribution of dengue virus serotype.

RESULTS

The serologic identification (IgM, IgM&IgG) of dengue virus serotype was done on serum samples positively infected by dengue virus. There were 513 samples examined in this study that came from districts/cities in the West Java province. From the 513 samples examined, 180 samples were identified for dengue virus serotype. Dengue virus was not found in the rest of the samples. All four serotypes were found in the West Java province. The overall frequencies of Den-1, Den-2, Den-3, and Den-4 virus identified were 34 (18.6%), 48 (26%), 88 (47.8%), and 10 (5.4%), respectively. Four samples showed multiple infections of 2 dengue virus serotypes. The multiple infections identified were Den-1+4 (1.1%), Den-1+3 (0.54%), and Den-2+3 (0.54%). Den-3 was the dominant serotype Den-3 serotype and was found in all the area of study. Four dengue virus serotypes were found in five districts/cities, 3 dengue serotypes were found in eleven districts/cities, 2 dengue serotypes were found in four districts/cities, and in three districts/cities there were only one dengue serotypes (Table 1).

DISCUSSION

Four dengue virus serotypes can be found in the West Java province. This finding was similar to a study by Porter *et al.* on the epidemiology of adult DHF cases in Bandung, which found in the course of the study, four dengue virus serotypes were detected.⁶ This showed that all four dengue virus serotypes circulated and sustained in the endemic areas in the West Java province. Harun has stated that an infection caused by one serotype can induce the production of antibodies to that particular serotypes, but antibodies to other serotypes will not increase and therefore will not give adequate protection.⁸ A person living in an dengue endemic area can be infected by 3 or 4 serotypes during his life time. This may be the reason for the high number of DHF cases in these endemic areas.

Table 1. Distribution of dengue virus serotypes in the districts/cities of the West Java province

| District/City | Den-1 | Den-2 | Den-3 | Den-4 | Mixed |
|----------------------|-------|-------|-------|-------|-------------|
| Distr. Tasikmalaya | 1 | 0 | 3 | 0 | 2 (Den-4+1) |
| Distr. Garut | 1 | 5 | 2 | 1 | |
| Distr. Bogor | 0 | 0 | 14 | 0 | |
| Distr. Majalengka | 0 | 0 | 1 | 0 | |
| Distr. Ciamis | 6 | 3 | 1 | 0 | |
| Distr. Bandung | 1 | 2 | 2 | 0 | |
| Distr. Bandung Barat | 2 | 0 | 1 | 0 | |
| Distr. Karawang | 0 | 0 | 3 | 0 | |
| Distr. Purwakarta | 1 | 11 | 3 | 0 | 1 (Den-2+3) |
| Distr. Indramayu | 1 | 0 | 7 | 1 | |
| Distr. Bekasi | 4 | 2 | 5 | 1 | |
| City Tasikmalaya | 1 | 2 | 3 | 3 | |
| Distr. Sumedang | 1 | 3 | 5 | 0 | 1 (Den-1+3) |
| Distr. Sukabumi | 0 | 2 | 3 | 0 | |
| City Bekasi | 1 | 2 | 2 | 0 | |
| Distr. Subang | 3 | 1 | 3 | 0 | |
| City Cirebon | 4 | 3 | 2 | 1 | |
| City Banjar | 5 | 0 | 2 | 0 | |
| City Bandung | 1 | 2 | 3 | 0 | |
| City Cimahi | 0 | 1 | 1 | 0 | |
| City Sukabumi | 1 | 3 | 9 | 1 | |
| City Bogor | 0 | 2 | 9 | 1 | |
| City Depok | 0 | 4 | 4 | 1 | |
| Total | 34 | 48 | 88 | 10 | 4 |
| Percentage (%) | 18.6 | 26.0 | 47.8 | 5.4 | 2.2 |

Den-3 is the dominant serotype found in the West Java province. It can be found in all districts/cities in the West Java province, followed by Den-2, Den-1, and Den-4. Suwandono *et al'* found that if Den-3 virus was the cause of DHF outbreak in a particular area, then generally Den-2 and Den-1 will be the second most frequent cause.⁹ This has been the classical phenomenon until 2003. Suroso also stated that Den-4 was the least serotype isolated from year to year.⁴

Suwandono *et al.* stated that since 1993, Den-3 still dominated as the cause of DHF, except in Yogyakarta and Bandung.⁹ In these two areas, Den-2 dominated as the cause of DHF. The results of this study showed that Den-3 is the most numerous serotype found in all endemic areas, including Bandung. This showed a change in the dominant serotype causing DHF outbreak in the West Java province. The data from various countries have shown that each dengue virus serotype can trigger an outbreak depending on the differences in geographical conditions and time.³ In 2002 there was a Den-3 epidemic in Brazil¹⁰ and in 1990 the Den-3

epidemic was in Puerto Rico.¹¹ Observations on dengue cases in Colombia by Requel *et al.* Showed that Den-3 was also the most dominant serotype involved in DHF outbreaks.¹² Increased frequency of Den-3 was also found to be related to the increase of primary infection of dengue virus. In short, it can be said that if an area has many types of circulating serotypes and a high frequency of Den-3 serotype, that particular area will have an increase the cases of DHF.

In conclusion, all four dengue virus serotypes can be found in the West Java province, with the most dominant being the Den-3 serotype. All four serotypes can increase the severity of DHF. The presence of Den-3 serotype in all the endemic areas in the West Java province should be of interest since many factors have been linked Den-3 serotype with increased outbreaks.

Acknowledgments

The authors wish to thank the Ministry of Health Republic of Indonesia for the grant supporting this study. The authors would also like to thank the Head

of the Provincial Health Office of West Java and staff, Head of the District/Municipal Health Office of West Java and staff, survey team, the community, and all the staff at *Loka Litbang P2B2* of Ciamis for their help in data collection and preparation of this study.

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