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Challenges in Against DHF in the Tropical Area

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ABSTRACT

Morbidity of Dengue Hemorrhagic Fever is the interaction between viruses, vulnerable hosts and mosquitoes in risky environments, what about rational management in the tropics? DHF agents are dengue virus, family Flaviridae, genus Flavivirus, serotypes Den-1, Den-2, Den3 and Den-4. Virulence of four virus serotypes has been found in fatal cases. The extrinsic incubation period of 8-10 days, intrinsic in humans 4-6 days, is transmitted from male mosquitoes to female mosquitoes through marriage, transovarial transmission from parent mosquitoes to their offspring. Highest transmission through mosquito bites Ae. Aegypti. Hosts 95% aged 15-44 years. Host immunity is influenced by age, nutritional status, density, population mobility, housing quality, distance between houses, education, work, life attitudes, age group, ethnicity, and vulnerability. Aedes mosquitoes originating from Brazil and Ethiopia, have two subspecies; Ae aegypti queenslandensis and Ae. aegypti formosus, including Stegomya subgenus, Aedes aegypti and Ae mosquitoes. albopictus as the main vector and Ae. polynesiensis, Ae.scutellaris and Ae (Finlaya) niveus as secondary vectors. Transmission factors are rapid urban population growth, population mobilization, poverty, garbage disposal, drying and closing, and recycling, the habit of hanging clothes. In the tropics, incidence is correlated with rainfall and humidity. Tropical and subtropical characteristics allow DHF to be endemic.

Keywords: management; dengue hemorrhagic fever; tropical

INTRODUCTION

Background

Dengue Haemorrhagic Fever (DHF) morbidity is the result of interactions between viruses, vulnerable hosts and mosquitoes in risky environments. In the past 50 years, dengue cases have increased 30-fold with geographical expansion into the wider regions of the country and, in this decade, from cities to rural locations[(1)]. Sufferers are found in most tropical and subtropical regions, especially Southeast Asia, Central America, America and the Caribbean. An estimated 50-100 million people are infected, half of whom are hospitalized and result in 22,000 deaths each year; an estimated 2.5 billion people, or nearly 40 percent of the world's population, live in dengue endemic areas that allow infection with dengue virus[(1)].

Purpose

Addressing challenges in rational management of DHF in areas with tropical geographical spatial characteristics.

METHODS

This study was conducted in 2020. The method applied in this study was perspective. Information was collected from various sources, especially theoretical references and the results of previous research and field experiences. The results of the study were presented in a narrative manner, which is then expected to be a stimulus for researchers to study more deeply through research using both qualitative and quantitative approaches.

RESULTS

Dengue Haemorrhagic Fever agents are dengue viruses including the family Flaviridae, a genus of Flavivirus consisting of 4 serotypes Den-1, Den-2, Den3 and Den-4. Virulence into all four serotypes of the virus have all been found in fatal cases. There are two hypotheses of immunopathogenesis of DHF and DSS events, namely secondary infection (secondary heterologous infection) and antibody dependent enhancement (ADE), which is still controversial. In the secondary infection hypothesis, if a person is secondary to a dengue virus serotype, there will be an immunity process for the dengue virus serotype infection for a long time, and there are 3 types of antibodies, namely neutralizing antibodies, hemagglutination antibodies, and complement fixation antibodies. But if the person is then infected secondary to another dengue virus serotype, there may be a severe infection [(3).] Extrinsic incubation period (in the body of a mosquito) lasts around 8-10 days, while intrinsic incubation (in the human body) ranges from 4-6 days and is followed by an immune response. Dengue virus is reported to have infected more than 100 countries, mainly in densely populated urban areas and settlements in Brazil and other parts of South America, the Caribbean, Southeast Asia and India[(2)]. Dengue virus is transmitted transexually from male mosquitoes to female mosquitoes through marriage[(1)], and transovarial transmission from the parent mosquito to its offspring. Transmission of dengue virus is also through blood transfusions as occurred in Singapore in 2007 from asymptomatic sufferers. However, the highest transmission of dengue virus is through the bite of Ae mosquito. aegypti[(5)].

Aedes mosquitoes originating from Brazil and Ethiopia, the adult stage is smaller when compared with the average of other mosquitoes. Both species of mosquitoes belong to the Aedes Genus of the Culicidae Family. Both morphologically are very similar, but can be distinguished from the white stripe found in the scutum. Scutum Ae. aegypti is black with two white strips parallel to the middle dorsal flanked by two white curved lines. While the Ae scutum. albopictus which is also black only contains one thick white line on its dorsal[(2)]. Ae Mosquitohas two subspecies namely Ae. aegypti queenslandensis and Ae. aegypti formosus. Subspecies Ae. aegypti queenslandensis lives freely in Africa, while subspecies Ae. aegypti formosus lives in the tropics which is known to be effective in transmitting dengue virus. Subspecies Ae. aegypti formosus is more dangerous than Ae subspecies. aegypti queenslandensis mosquitoes [(2)]. The dengue virus transmitters include the Stegomya subgenus, the Aedes aegypti and Ae mosquitoes. albopictus as the primary vector and Ae. polynesiensis, Ae.scutellaris and Ae (Finlaya) niveus as secondary vectors[(1)], Aedes aegypti and Ae mosquitoes. Albopictus, both of which are found throughout Indonesia, live optimally at altitudes> 1000 meters above sea level, but from some reports can be found in areas with elevations up to 1,500 meters[(6)], even in India it is reported to be found at 2,121 meters and in Colombia at an altitude of 2,200 meters above sea level. Aedes mosquitoes bite during the day, live between 35oLS-35oLU, can live at temperatures of 10o-45oC but generally live in warm and humid weather at an altitude of <1000 meters above sea level[(1)]. Humidity means 75.8%, min 57.1%, max 85.8%, up to 6.6mm have a correlation coefficient r = + 0.351 sig. 0.002. and Mean Rainfall of 6.2mm min0.0mm, max 21.7mm, up to 5.8mm have a correlation coefficient of r = + 0.230 sig. 0.042. Every millimeter (mm) in the unit is meant by calculation (1 mm x 1 mx 1 m), so that the volume of rainfall per square meter is one liter[(7)]. Absolute humidity is defined as the mass of water vapor at a particular volume of air mixture or gas, and is generally reported in grams per cubic meter (g /m3)[(8)]. The tropics, covering all parts of the earth, experience twice a year around the Sun directly above the head (in the north of the GBU and in the south of the GBS the Sun never reaches a height of 90 ° or directly above the head). The tropics are warm and humid places throughout the year. Tropical climate is a climate that occurs in areas crossed by the equator or equatorial area where the area is located between 23.5 ° N and 23.5 ° S. Areas that have a tropical climate have only two seasons, rain and dry, as the following illustration[(9)].

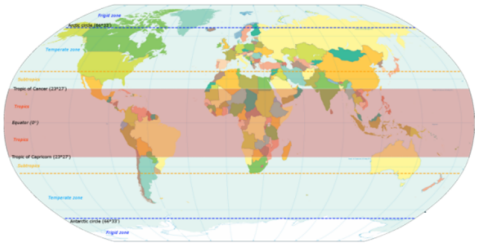

Figure 1. Areas that have a tropical climate have only two seasons, rain and dry

Advantages and disadvantages of tropical climates: 1) Getting sunshine all year round, 2) Relatively high rainfall, flooding during the rainy season, 3) Amplitude of average annual temperature is small, average monthly temperature> 18 ° C throughout the year, temperature average 27 ° C, 4) Well-developed and diverse flora &

fauna, including DHF vector, 5) Has 2 seasons, rainy & dry season. Minimum annual rainfall ranges between 1750 mm and 2000 mm[9]; according to WHO the distribution of DHF as follows[1]

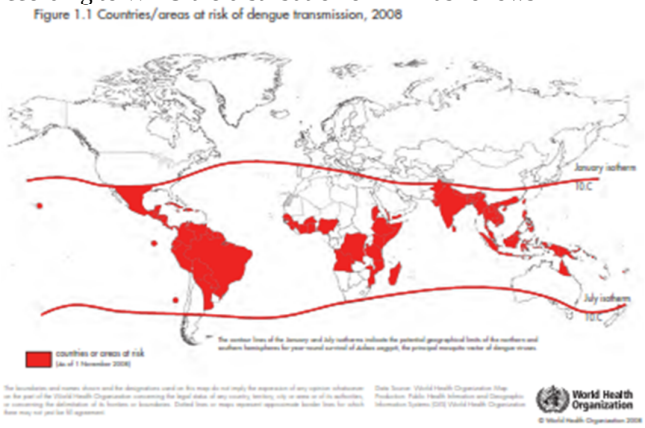

Figure 2. The distribution of DHF according to WHO

Dengue Haemorrhagic Fever hosts are 95% in the age group <15 years which is currently experiencing a shift with an increase in the proportion of patients in the age group 15-44 years, sufferers in the age group> 45 years are very low as happened in East Java, around 3.64%. People who are active are less bitten by mosquitoes, people who are silent (not moving) are 3.3 times more bitten by mosquitoes Ae. aegypti so that the risk of contracting the dengue virus is greater. Host immunity to infection is influenced by factors of age and nutritional status, old age will decrease the immune response and nutrient absorption. Nutritional status is influenced by the balance of intake and absorption, especially macro nutrients that affect the immune system. In addition to macro nutrients, iron and zinc micronutrients affect the body's immune response, if a deficiency occurs, one of the nutrients will damage the immune system. The incidence of DHF, due to multiple causes that interact with each other, is also influenced by factors predisposing population density and mobility, housing quality, distance between houses, education, employment, life attitudes, age groups, ethnicity, and susceptibility to disease. The number of DHF cases has never decreased in several tropics and subtropics and even tends to continue to increase and cause many deaths in children.

DISCUSSION

Risk of DHF transmission are rapid urban population growth, population mobilization due to improved transportation facilities and infrastructure and disrupted or weakened population control so that outbreaks are possible. Other risk factors are poverty which results in people not having the ability to provide decent and healthy homes, drinking water supply and proper disposal of rubbish[2]. But on the other hand, DHF can also attack more affluent residents especially those who are accustomed to traveling. From research in Pekanbaru, Riau Province, it is known that the factors that influence the incidence of DHF are education and community work, the distance between houses, the presence of water reservoirs, the existence of ornamental plants and yards as well as population mobilization; while the layout of the house and the presence of larvae are not risk factors. Risk factors that cause the emergence of anti-dengue IgM antibodies which are primary infection reactions, based on research results in the Brazilian Amazon region are male sex, poverty, and migration. While the risk factors for secondary infections that cause DHF are male sex, history of ever having been affected by DHF in the previous period and migration to urban areas[5]. In the tropics for example in Indramayu Regency, the practice of draining, closing and recycling / getting rid of it in home (OR = 2,778; 95% CI: 1,174-6,574) and habit of hanging clothes (OR = 3,470; 95% CI: 1,271-9,472) as risk factors for dengue hemorrhagic fever (DHF) in Indramayu Regency[11]. In the region tropical incidence of DHF correlates with rainfall ($p < 0.0001$)[12].

Management of DHF in general now rationally there are 10 components to reduce DHF cases[10), (1], involve:

1. Human resources in this regard, it is necessary for trained doctors and nurses to be placed in the first level of service up to the referral center level service. The personal service at the referral center level should be able to identify "triage" and manage emergency services for DHF, receive case referrals, especially during outbreaks and outbreaks. This personal needs to be improved thinking ability about DHF.
2. Special area. The special area is equipped with sophisticated equipment, as well as personal with adequate skills, which is set to provide immediate medical action in transit services for patients with intravenous fluids until the patient can be transferred to the DHF treatment room or referred to a health facility.
3. Laboratory resources Most important is the laboratory for hematocrit and blood checks. The results of the

examination are expected to be known at the latest within 2 hours in severe cases of DHF. If laboratory services are not obtained, the minimum standard is "the point-of-care testing" of hematocrit by capillary (finger prick) blood samples with the use of a microcentrifuge. To reduce the case of death due to DHF also required a laboratory capable of investigating DHF for the purposes of diagnosis and management of DHF disease as well as necessary referrals.

4. Consumables: These are the ingredients needed in the management of DHF diseases such as intravenous fluids such as crystalloids, colloids and intravenous giving sets.
5. Drugs: For light cases is prepared antipyretics and oral rehydration salts. For severe cases, can be added include (Ca gluconate, vitamin K1, furosemide, NaHCO3, glucose, KCl solution, vasopressor, and inotropes).
6. Communication: Facilities should be provided for easy communication, especially between secondary and tertiary levels of care and laboratories, including consultation by telephone.
7. Blood bank: Blood and blood products will be required only by a small percentage of patients but should be made readily available to those who need them.
8. Vector Management: Integrated vector management is "a rational decision-making process for the optimal use of resources for vector control" with five key elements, namely: 1) advocacy, social mobilization and legislation - the promotion of these principles in the development policies of all relevant agencies, organizations and civil society; the establishment or strengthening of regulatory and legislative controls for public health; and the empowerment of communities; 2) collaboration within the health sector and with other sectors - the consideration of all options for collaboration within and between public and private sectors; planning and decision-making delegated to the lowest possible administrative level; and strengthening communication among policy-makers, managers of programs for the control of vector-borne diseases, and other key partners; 3) integrated approach to disease control - ensuring the rational use of available resources through the application of a multi-disease control approach; integration of non-chemical and chemical vector control methods; and integration with other disease control measures; 4) evidence-based decision-making - adaptation of strategies and interventions to local vector ecology, epidemiology and resources, guided by operational research and subject to routine monitoring and evaluation; 5) capacity-building - the development of essential infrastructure, financial resources and adequate human resources at any level to manage IVM programs.
9. Dengue surveillance: Surveillance is needed in order to suppress DHF mortality cases, with 3 minimal activities: 1) epidemiological surveillance for dengue as an agent, 2) surveillance vectors, 3) monitoring of environmental and social risks.
10. Developing a dengue vaccine and dengue antivirals: 1) Dengue vaccine: Ideally reducing cases of death due to DHF should also be accompanied by prevention efforts by administering vaccine to provide humoral immunity in a population at risk. As we know that DHF is caused by four serologies associated with the virus. The main problem in developing DHF vaccine is how the vaccine can provide immunity to fight all four virus attacks simultaneously. Therefore, the vaccine should be tetravalent. 2) Anti-viral dengue: Due to the general biological structure of dengue virus, in the future the anti-viral drug development strategy is developed following appropriate efforts for HIV and HCV cases, to be adopted by dengue virus characteristics during HCV and dengue is still a member of the Flaviviridae family. The drug should be active against all four serotypes, reduce severity of the disease and reduce symptoms.

CONCLUSION

Based on the spatial demographic characteristics, the tropics have an endemic risk of DHF, therefore rational management of DHF responds to the challenges in fighting DHF in the tropics as follows; **first:** Always improve human resources, **second:** Always prepare the special area is equipped with sophisticated equipment, **third:** Always increase laboratory resources, **fourth:** Prepare consumables needed for the management of DHF, **fifth:** Always prepare drugs for mild cases and severe cases, **sixth:** Always improve communication services, **seventh:** Always improve blood bank services and blood products, **eighth:** Always improve integrated vector management, **ninth:** Dengue surveillance to reduce dengue death cases, **tenth:** Developing dengue vaccine and dengue antivirus.

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