

PERIODISITY OF MICROFILARIAE MALAYI AT CENTRAL BORNEO PROVINCE

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ABSTRACT

BACKGROUND. Lymphatic filariasis (LF) is one of the major public health problems in Indonesia. All three types of lymphatic parasites namely *Wuchereriabancrofti*, *Brugiamalayi* and *Brugiatimori* are prevalent in Indonesia. An estimated 125 million people are at risk of filariasis infection, in 337 endemic districts. In Kota Besi Subdistrict there was 51 cases microfilariae, two of them less than 15 years old. Distribution of the disease tends to spread in rural areas and epidemiological data especially periodicity is needed to eliminate this disease.

AIM. The research aims to find the periodicity of microfilariae in human patients.

METHOD. This research conducted in Kota Besi Sub District, Kotawaringin Timur District, Central Borneo Province. This is Observational Study with 386 samples. Examination parasite with Thick blood smear technique and blood is taken at night (08.00 pm– 06.00 am). If a sample positive microfilariae a respondent blood will be taken again to know the periodicity of microfilariae in their blood. Determining of periodicity with Aikat and Das method to calculate a peak of microfilariae density.

RESULT. Four persons of 386 are microfilariae-positive were examined by the fingerprick method. *Brugiamalayi* was found in four persons microfilariae-positive, microfilariae periodicity in this location is nocturnal periodic with harmonic waves and nocturnal sub-periodic with the non harmonic waves.

Conclusion. Lymphatic Filariasis in Kota Besi caused by *Brugiamalayi* and periodicity is nocturnal and sub periodic nocturnal. Sub-periodic nocturnal is zoonosis so the elimination is different with the other species of filariae helminth.

Keywords: *Brugiamalayi*, Lymphatic filariasis, Periodicity.

INTRODUCTION

Filariasis infects 120 million people in 83 countries worldwide and one fifth of world population or 1.3 billion people in 83 countries are at filariasis risk¹. This disease is one of the major health problems in Southeast Asia with more than 60% area of the infected population, while 30% occurs in Africa².

The Ministry of Health Indonesia reported, filariasis cases increase every year. In Borneo region in 2008 the highest prevalence was in East Borneo Province with 409 cases. South, West, and Central Borneo Province were 385, 253 and 225 respectively³. Central Borneo province consists of 14 districts. Based on health profile of Central Borneo in 2007 there were 254 cases. Seven out of 14 districts are endemic for filariasis cases. Those are 157 cases in East Kotawaringin District, 28 cases in West Kotawaringin, 27 cases in Seruyan, 25 cases in Kapuas, 10 cases in South Barito, 4 cases in Gunung Mas, 2 cases in Katingan and the last 1 case in Sukamara⁴. The highest microfilariae rate was in Kota Besi subdistrict in East Kotawaringin district⁵.

Filariasis mostly found in Pamalian Village in Kota Besi subdistrict. There was 51 filariasis cases, two of them less than 15 years old. This is probably related to environmental conditions of such spot which is a devious village in the forest and there are many marshes overgrown with water plants. A successful filariasis elimination program requires accurate identification of infection transmission, a comprehensive surveillance strategy to detect the source of infection, and mass treatment campaigns through cultural approach and education. This study aims to find out the microfilariae periodicity in Kota Besi subdistrict

METHOD

This study was a descriptive observational study conducted in Pamalian village, Kota Besi subdistrict, East Kotawaringin. Five hundred person were examined by the fingerprick method (20 mm³ blood)⁶ but the field study obtains only 386 samples who are willing to respond and to have blood drawn.

The periodicity of *B. malayi* from several endemic areas of Indonesia was reinvestigated. Blood samples were collected from known microfilaria (mf) carriers every 2 h for a 24-h period. Blood films were air dried for at least 48 h before being processed and other necessary precautions were taken to prevent loss of mf. Blood collection, staining of blood films, and mf counts were performed by the same person throughout the study. Mathematical methods were used to characterize the periodicity patterns of mf. The peak hour was calculated by the method of Aikat and Das⁷. To investigate the stability of periodicity patterns it's not be done.

RESULTS

Brugia malayi was found on four people at night capillary blood survey among 386 people. *Microfilariae* (Mf) rate was 1.04%. These results indicate that Pamalian village is an endemic lymphatic filariasis.



Figure 1. Microfilariae in a Patient Blood.

Periodicity of microfilaria was observed from four patients. The peak of microfilaria was at 10 pm (Figure 2). Periodicity examination was done only once. The result shows the presence of microfilariae in capillary blood which is not always found at any time during the 24-hour observation.

Figure 2 shows that the overall number of microfilariae in a row from mf-positive patient.

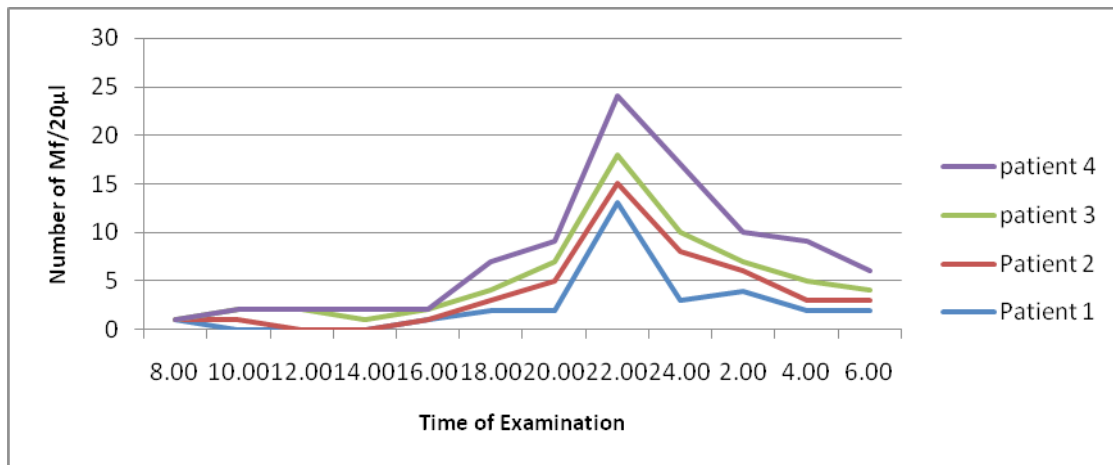


Figure 2. Peak Density Fluctuation of Microfilariae (*Brugia malayi*) in the Periphery Blood Over 24 Hours Examination in Pamalian Village

In table 1 convey the following statistical calculations microfilaremia with four patients.

Table 1. Statistical Analysis of Microfilariae Periodicity Examination in Four Patients in Pamalian Village.

Statistical Analysis	Microfilaremiae			
	Patient 1	Patient 2	Patient 3	Patient 4
Y	30	16	17	28
Y ²	212	46	31	128
Y cos 15h	18,722	9,598	3,232	16,928
Y sin 15h	-4,5	-1,232	-1,866	-1,268
m	2,5	1,33	1,42	2,33
b	3,12	1,59	0,54	2,82
c	-0,75	-0,21	-0,311	-0,211
a	3,21	1,60	0,62	2,83
K	24.09'60"	24.05'20"	24.23'20"	24.04'40"
F	4,08	6,48	-2,41	6,98
D	128,40	120,30	43,66	121,45

Table 1, shows peak density of microfilariae the first patient is at 24.09'60". D value indicates the periodicity of microfilariae are nocturnal, while the value of F is less than 5% indicates the characteristics of the non-harmonic wave. There is one patient who has subperiodic periodicity character of the patients to the three waves with non harmonic. Patient one, two, and four show periodic nocturnal with harmonic wave in the second and fourth patient.

DISCUSSION

Distribution of *Brugiamalayi* are mostly located in tropical regions, although can be found also in the sub-tropics. The research location are located in East Kotawaringindistrictat 107°15'30" East Longitude - 110°29'30" East Longitude. The nature conditon in general in East Kotawaringinconsists of a lowland swamp, forests and hilly areas and beach. This conditionmay be supports a development of the vector of *Brugiamalayi*.

Based on research conducted, the characteristics of microfilariae in the research location are nocturnal periodic and nocturnalsubperiodic. Periodicity of the microfilariae for this mechanism is not clearly known, but there are several factors that may play a role in the mechanism, such as the adaptation of microfilariae by mosquito feeding habits, O₂ pressure difference between venous and arterial blood, as well as hospes activity⁸. In addition to this opinion there are other opinions that affect the periodicity of microfilariae is associated with the hormone melatonin on host.

Melatoninhormone (N-acetyl-5-methoxytryptamine), is a neurotropic hormone with indolamina antioksidant group, which is synthesized by the pineal gland located in the brain of aminotriptofan acid compound. The process of synthesis and release of melatonin production distimulus by darkness and suppressed by light. This shows the role of melatonin in circadian rhythm (the body's natural rhythm)⁹.

To maintain its existence, the filarial worms need to ensure that the density of microfilariae in peripheral blood remains high by 1) producing microfilariae as much as possible, thus increasing the overall density in the blood combined with 2) the behaviour adaptation of microfilariae of bitingbehaviour vector mosquitoes¹⁰.

The Government of Indonesia has decreed filariasis elimination as one of national priorities communicable diseases and agreed to participate in the international goal to eliminate LF as a public health problem by 2020. The LF program's objectives in Indonesia are to reduce and eliminate transmission of LF by MDA, and to reduce and prevent morbidity in affected persons. In 2009, MDA with diethylcarbamazine (DEC) + albendazole covered more than 19 million people in 30% of the endemic districts, with an average program drug coverage rate of 66.5% of the at-risk population in those districts. According to the 2011-2014 National Plan for LF, the central government is responsible to ensure the procurement of drugs and provide¹¹, using special population groups named TPE (Tenaga PelaksanaEliminasi) were to distribute the drugs either door-to-door or at community congregations. Lack of socialmobilization and advocacy for MDA along with paucity of funds and pooraccessibility of some regions were some of the constraints faced by theprogramme. In addition delays in the procurement of drugs and fear of sideeffects adversely affected the implementation of MDA¹².

The success of a program is the interaction of various factors that complement each other as a unit. The good behaviour of people in the Pamalian village and good treatment will not be able to show optimal results without the support of other factors, such as the environment. Poor physical environment in the Pamalianvillage is a threat and could be always there as a transmission of lymphatic filariasis medium. There are not many houses using mosquito proofin the Pamalianvillage and is one risk factor for transmission of this disease. The determinant in the success of elimination programs in a region / country influenced by 1) the initial endemicity level of lymphatic filariasis zone, 2) the effectiveness of the vector (mosquito), 3) the rules / procedures of mass treatment, 4) compliance of the residents¹³. Need to be followed by further examination by another study, whether or not in 2 or 3 more years, *mf rate*, *ACD*, *CDR*, and the density of microfilariae in the blood of residents in the Pamalian village will still show a low rate in thenext year. When the environmental factors are

not modified to reduce the risk of filarial infection, may be people with positive microfilariae will still found in this village.

CONCLUSION

Microfilariae malayiperiodicity in this location is nocturnal periodic with harmonic waves and nocturnal sub-periodic with the non harmonic waves. *Brugia malayi* sub-periodic nocturnal is a zoonosis disease, *Presbytis cristatus*, *Macaca fascicularis*, *Felis catus* can be a natural host beside a human.

SUGGESTION

Elimination project for filariasis malayi, especially caused by *Brugia malayi* sub-periodic nocturnal not only to find and give a medicine to infected people, but it also to protect human from mosquito biting like using repellent during sleeping or working in a jungle, and using bed net is important to. We can't give a treatment to animal, so the one we can do only protecting human from biting and improve an environment sanitation.

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