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Effect of Characteristics Breeding Site Againts Density of Larva Anopheles in Tegalombo Sub District Pacitan Indonesia

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Abstract

The purpose ofthe studywas to determinethe influence ofbreeding siteon thedensity oflarvalAnophelesbreedinginthe VillageNgreco District ofTegalomboPacitan Indonesia. The study wasobservationalwith*cross sectional*approachconductedinfoursub-districtHamletVillageNgrecoTegalomboPacitanin May-June 2014. The population and the sample contained 15 breeding sites of *Anopheles* larvae were found in four hamlets namely Krajan, Gamping, Nglodo, and Jajar in the village Ngreco. *Accidentalsampling*is asampling. The analysis used is*multiple linear regression*withα =0. 05**.** The results of the study of Anopheleslarvae breeding sites found as many as 10 pools, 2 rivers, and 3 paddy. based on*multiple linear regression*. The influenceof thedensity ofAnopheleslarvaeistemperature (p =0. 006, p <0. 05), humidity (p =0. 002, p <0. 05), Animalwater (p =0. 000, p <0. 05). Multivariate analysis with multiple linear regression found that temperature, humidity and animal water related to the density of Anopheles larvae. Advice toagenciesandthe publictoalwaysmonitor theplaceas a potentialbreeding ground forAnopheleslarvaeand the eradication ofAnopheleslarvaetothe publicfree ofmalaria.

Keywords: Environmental characteristicsof breeding, larvaedensity ofAnopheles

Introduction

Malaria is a disease caused by parasites of the genus Plasmodium that belonged to Protozoa through the intermediary of a puncture insects female anopheles mosquito [23]. Environmental characteristics are very dominant in determining the development

of the larvae of Anopheles spp, among which the physical environment consisting of temperature, humidity [4], the depth of water, rainy weather and so forth [3, 24, 29] as well as very influential on the chemical environment that includes water pH, salinity. Scope of breeding sites can not be separated from the biological environment in the form of aquatic animals, aquatic plants and other [2, 28].

Banks of rivers and streams, rain while, pools, ponds, dams, drainage channels, holes burrow, fields of rice paddies, swamps, puddles on the road and in the holes of trees close to human habitation is a breeding ground the mosquito Anopheles [20, 26]. However, mosquitoes differ in their preferences for the type, size, turbidity, the presence of algae and habitat stability [13, 17]. These factors determine the density, size and competence transmission of vector-borne diseases [13, 26]. Ecological and meteorological parameters contribute not only to the vector mosquitoes but also for the development of the parasite Plasmodium Anopheles vectors. Plasmodium transmission by vectors, where the environment are an important determinant of malaria transmission. Geo-climatic factors (temperature, humidity, air quality) determines the presence of the Anopheles mosquito breeding sites, vector density, long life and capacity of the adult mosquito vector [29]. Research [28] mentions that the number of mosquitoes of the Anopheles species are largely influenced by various factors, including the weather (eg, temperature, precipitation, humidity, seasonal cycles) and habitat (eg, habitat size, surface area, habitat characteristics).

Several studies have shown a link between environmental factors and the incidence of malaria in native populations [30]. Among the many environmental factors that determine the transmission of malaria, water is one of the most important because it is a basic requirement for the presence of breeding sites for the vector Anopheles [29].

Temperature is one of the major meteorological parameters associated with the transmission of malaria, and is a determining factor that helps in determining the persistence of breeding sites, duration of larval development, the survival rate of adult mosquitoes, duration and cycle gonotrophic sporogonic [29]. Studies show that in laboratory conditions, the rate of development of Anopheles gambiae ss of the immature stage to increase the next higher stage occurs at a peak temperature of about 28° C, after which it decreased. The emergence of adult mosquitoes optimally between 22° C and 26° C and inhibited at temperatures below 18° C or above 34° C [3, 29]. In addition to the temperature of the important factors that affect the development of the anopheles mosquito vector is the humidity. The relative humidity especially have an impact on the presence and continuity of the site during the breeding and survival of adult mosquitoes. These parameters can be calculated from the meteorological parameters as described in [4].

One method that can be used to measure levels of vector transmission entomologic is the reference method although this method is not absolute implemented. NDVI (Normalized Difference Vegetation Index) have been commonly used to evaluate the density of mosquitoes. This indicator has been associated with the incidence of clinical malaria cases [27], the density of the vector and malaria transmission [26]. All of these studies have been conducted in the native population of malaria-endemic areas.

Based on the results of routine survailens malaria in 2012 there were 31 districts / cities were informed of cases of malaria in East Java 4 malaria endemic districts imporatau High Case Incidence (HCI) one Pacitan. Figures Annual Parasite Incidence (API) malaria in East Java reached 0. 12 per 1000 population at risk. Most malaria cases imported amounted to 93. 8% or 1320 people with indigenous case or cases originating from the transmission in the local area as much as 9 people or 6. 2%. [9]. The number of cases in Pacitan ranked second as many as 223 cases. Monitoring and prevention programs conducted in each area of the Department of Health has been very effective in reducing the incidence of malaria. Emphasis decline in malaria cases in the area Pacitan as much as 22% or 49 cases [9]. In 2012, most cases found in the area of PHC Tegalombo, Tulakan, Punung and Kebonagung. While other Puskesmas found cases of malaria with much smaller amounts and the only Puskesmas Kalak not found cases of malaria.

Malaria transmission can be limited by reducing the adult mosquito population so that control of larval breeding is important to reduce the adult mosquito population. The introduction of mosquito breeding sites and density of larvae is very important in vector control efforts are terapadu to manage or eliminate mosquito breeding places [2]. However, the current knowledge of the distribution and dynamics of water stages of mosquitoes inadequate [1]. Restrictions on malaria transmission can be done by reducing the adult mosquito population so we need a program to control the density of larvae. However, the current knowledge about the distribution and dynamics of the water phaseinadequate mosquito transmission of malaria so that restrictions can't be done optimally [1]. The study aims to determine the effect of breeding site characteristics (temperature, aquatic animals and humidity) at a density of Anopheles mosquito larvae in the village of East Java, Indonesia Ngreco Tegalombo.

Research methods

This study is an observational study with cross sectional approach. This research was conducted in the village of the District Ngreco Tegalombo Pacitan in June 2014. The population in this study are all breeding grounds for Anopheles larvae were found in the village Ngreco Tegalombo District of Pacitan with a total population of 15 breeding sites found Anopheles larvae. The sample in this study is that there is a breeding ground for Anopheles larvae in four hamlets namely Krajan, Limestone, Nglodo, and Jajar in Ngreco village, as well as the number of larvae that terciduk. The sample used was accidental sampling with 15 sample. Sample inclusion criteria include: a breeding ground for Anopheles larvae which are breeding grounds and distance from their homes at a radius of 500 meters.

The independent variable in this study is the proliferation of environmental characteristics (temperature, humidity and aquatic animals).

The temperature is hot or cold conditions at breeding sites surveyed by using a measuring instrument thermometer. Humidity is a measurement of the level of humidity near breeding sites measuring devices hygrometer. Aquatic animals is the number of animals in breeding grounds affecting the growth and development of larvae of Anopheles such as tin fish heads, fish tilapia, and other fish using crawler,

uses to catch fish in breeding grounds. The dependent variable in this study is the density of Anopheles larvae in the village Ngreco Tegalombo Pacitan District of Indonesia which is the number or density of larvae in breeding sites is calculated by the number of mosquito larvae were caught divided by number of detention. Larval density was measured using the tool:

a. 250 ml measuring cup, how to use the glass on hold and then dipped into a breeding ground with a slope of about 45 ° and crackdown water should be up to the limit of 250 ml.
b. Clamplarvae, howtousetheclampinglarvaedrawninameasuringcup.
c. Twokindsofplasticcontainersorplasticcups, usefulnesstoasuccessfullarvaldrawnandusedtoputpredatoryanimals arecaught.
d. Tableobservations, notingtheresultsoflarvaldrawndetentionfivetimes inameasuringcup

Technique data collecting quantitative data, obtained from direct observation on the spot research targets with the help of the clinic as many as two people who were part prevention and suppression of malaria in health centers Tegalombo, then in measuring temperature, humidity and biota in the breeding place with record all the results of such measurements. Identify the types of biota in nearby breeding and noted in observation sheets, as well as the crackdown in the breeding of Anopheles larvae then counted the number of larvae per drawnin detention. Larval density is calculated from the average measurement results then matched with larvae index. Univariate analysis is used to obtain a description of each variable is presented in the form of a frequency distribution table that is narrated in order to obtain an objective picture of the condition of the density of Anopheles larvae. Bivariate analysis to test the effect of independent variables and the dependent variable are performed with Pearson product moment test. Multivariate analysis using multiple linear regression is used to determine the effect of temperature, humidity and aquatic animals to the number of Anopheles larvae.

Result and Discussion

Breeding Site Anopheles larvae distribution of physical characteristics seen in the village Ngreco Tegalombo District of Pacitan Indonesia is known mostly in pools of (66. 67%). This study investigates the influence of temperature, humidity and aquatic animals to the density of Anopheles larvae. The study found that the majority of larvae of Anopheles breeding site is a puddle. The development of the Plasmodium parasite and vector Anopheles mosquito vectors are influenced by the role of ecological and meteorological parameters. Water is one of the most important environmental factors since water is one of the basic needs for the life of the vector Anopheles. Anopheles mosquito larvae can develop if the water appears and durable over time [29]. Studies shown that during the rainy season increased cases of malaria and mosquito vectors is affected by geographical and environmental suitability [24, 29]. [18] found that the risk of malaria transmission by An. funestus decline in irrigated rice fields but has no effect on malaria transmission by An. arabiensis.

Research [7] indicate the presence of An. arabiensis and An. funestus in malaria patients home who live near rice fields were flooded.

Table 1: Distribution Breeding Site Anopheles larvae by Hamlet in the Village District of Tegalombo Ngreco Pacitan Indonesia

Breeding Site	**Village**				**Total**	**%**
	I	**II**	**III**	**IV**		
Wallow	2	2	3	3	10	66, 67
River	1	1	0	0	2	13, 33
Paddy field	2	1	0	0	3	20, 00
Total	**5**	**4**	**3**	**3**	**15**	**100**

From table 2 it can be seen that most of the characteristics of breeding sites of Anopheles larvae were seen based on the chemical characteristics can be seen from the temperature is known that the mean value 27, 866^0C, humidity 70 and the presence of aquatic animals6, 067. Results of the study found that the average temperature is 27, 866° C which is characteristic of optimal chemical environment for the development of the larvae of Anopheles. Studies show that in laboratory conditions, the rate of development of Anopheles gambiae ss of the immature stage to increase the next higher stage occurs at a peak temperature of about 28° C, after which it decreased. The emergence of adult mosquitoes optimally between 22° C and 26° C and inhibited at temperatures below 18° C or above 34° C [3, 29]. In studies [29], the risk of clinical malaria increased significantly when the average temperature is higher than 27° C. Other studies explain that the density of larvae associated significantly with water temperature, habitat type, number of existing plants [16].
Study [33] mentions that the temperature and precipitation are affect the development of malaria. [4] explains that the humidity parameters can be calculated from the meteorological parameters, but should be used with caution. The relative humidity especially have an impact on the presence and persistence of breeding sites and the survival time of adult mosquitoes. Indeed, it is a function of air humidity and air temperature, so it can change significantly during a given day. Vegetation development depends on the amount of water available, the vegetation index could be a surrogate marker of rainfall period and certain regions. NDVI integrate the combined effects of rainfall, humidity, sunlight, temperature, altitude, land use and land cover [5], all of these factors potentially linked to the existence of favorable sites for the anopheles vector, ie for larval development (breeding grounds) and survival of adult mosquitoes [29].

Table 2: Characteristic Anopheles larvae Breeding Site

Descriptive Statistics	Temperature	Aquatic animals	Humidity
Mean	27, 866	6, 067	70, 000
Median	28, 300	5, 000	69, 000
Modus	23, 200	0, 000	68, 000
Std. Deviasi	2, 698	5, 229	2, 070
Minimum	23, 200	0, 000	68, 000
Maksimum	31, 500	15, 000	75, 000

From Table 3 it is known that there is significant influence of temperature (p value = 0. 006), moisture (p value = 0. 002) and aquatic animals (p value = 0. 000) with a density of Anopheles larvae. Aquatic habitats is an important component of the transmission of malaria. This habitat is critical in determining the type of vector of malaria in the area, their abundance and population dynamics of the emergence of adult mosquitoes [19]. The presence of fish, however, was significantly correlated with the distribution of all species of mosquitoes, with a significantly higher density of mosquitoes in ponds left behind. In both active and abandoned pools, An. gambiae S. L. is a species of mosquitoes most commonly found with proportionately more abundant in an abandoned. If the water body does not contain fish are more likely to develop mosquitoes rather than a body of water that contains fish therein in which the numbers of mosquitoes were lower in areas that do not contain fish compared to areas containing fish [25]. Previous research has found that the pond contained more mosquitoes in abandoned fish ponds than active fish farms, although this difference was not significant when all kinds of mosquitoes are combined. However, significantly more abandoned pools contained mosquitoes of any type when mosquitoes are separated. This may be due to An. gambiae s. s. in water containing a competitor trying to avoid ovipositing. In this case An gambiae S. L might look An. funestus as a competitor, and perhaps also that the same mechanism is in An. funestus. The results showed that the fish significantly affect the distribution of anophelines and culicines in the research area. [25]. Past studies have shown that effective mosquito control and prevention of malaria-related can be done by giving larvivorous fish in all ponds.

Table 3: Bivariate Analysis Results Effect of Temperature and Aquatic animals against Anopheles larvae Number

Variabel	P	Description
Temperature	0, 006	H_0 ditolak
Humidity	0, 002	H_0 ditolak
Aquatic animals	0, 000	H_0 ditolak

From the results of multiple linear regression is known that the temperature factor (p value = 0. 034), moisture (p value = 0. 000) and the work of parents (p value = 0. 000) jointly affect the density of Anopheles larvae. The coefficient of determination (R^2) of 0. 978 means that 97. 8% of Anopheles larvae density can be affected by temperature, humidity and aquatic animals and of 2. 2% can be explained by the influence of others. Various factors that cause larval mortality include age larvae [8, 12, 21] that the density of larvae depend on predation, cannibalism and competition source power that occurs in the larval population [8, 15] habitat capacity and weather factors such as rainfall [8, 12, 22]. Therefore, controlling the larvae that have so far been given little attention, should be reintroduced and implemented together with the existing strategy [1].

Eradication of malaria vectors and can be done with a focus on controlling larvae in the area [14]. In areas where transmission is low or moderate, the focus of malaria control activities in restricted areas should be able to increase the success and cost-effectiveness of the program [6]. Thus, the ecological requirements leading to the presence of breeding sites and a good knowledge of the dynamics of mosquitoes is very important. A deep understanding of the dynamics of the mosquito could even help to target to control larval habitats are most productive, thus increasing the effectiveness of controls [31]. Research in Dakar has shown that there is a high degree of correlation between the density of larvae and adult mosquitoes in every region and most productive habitats can be identified so that control the development of malaria in Dakar benefit from management larvae [16]. Limitations of this study is the breeding site characteristics studied only the temperature, humidity and aquatic water. Other factors that were not measured in this study that may affect the density of larvae, such as water depth, rainy weather and so forth [3, 29, 24] and is very influential on the chemical environment that includes water pH, salinity, the biological environment in the form of aquatic animals, aquatic plants and other [2, 28] need to do research. Management larvae need to be done in order to control and eradicate malaria larvae [16].

Table 4: Multiple Linear Regression Test Results

Variabel	p	R^2
Temperature	0, 034	
Humidity	0, 000	0, 978
Aquatic animals	0, 000	

Conclusion

This study underlines that the puddle is a dominant Anopheles larvae breeding in the village Ngreco Tegalombo Pacitan Indonesia. Three factors temperature, humidity and aquatic animals individually or jointly have a significant impact with a density of Anopheles larvae. Knowledge of the characteristics of breeding sites is important in controlling the density of Anopheles larvae in order to eradicate malaria in the village Ngreco Tegalombo Pacitan Indonesia.

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