UTILIZATION OF BIDARA LEAF (*Ziziphus mauritiana L.*) EXTRACT AS A NATURAL LARVACIDE

PEMANFAATAN EKSTRAK TANAMAN DAUN BIDARA (*Zhizpus mauritania L.)* SEBAGAI LARVASIDA ALAMI

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the Dengue virus and is transmitted through the mosquito vector of Aedes aegypti. DHF cases in Indonesia were reported in 2019 as many as 138,127 cases. The purpose of the study was to determine the effectiveness of using Bidara Leaf as a natural larvicide. This type of research is purely experimental because the larvae of Aedes aegypti are treated by being put into a solution that has been mixed with bidara leaf extract with several variations, namely 0.5 ml, 1 ml, 1.5 ml and 2 ml. The location of the research was carried out in the Integrated Laboratory of Poltekkes, Ministry of Health, Mamuju. The part of the bidara plant used is the leaf. Bidara leaf extract is obtained by making bidara leaf simplicia. Based on the larval mortality table above, it can be seen that in a 0.5 ml solution of bidara leaf extract, no larvae died. In a solution of 1 ml of bidara leaf extract, the larvae began to die at 40 minutes of observation with an average mortality of 2 from each treatment. At 60 and 80 minutes of observation, the average mortality was 2 and 1.6 from each treatment. In a solution of 1.5 ml of bidara leaf extract, the larvae began to die at 40 minutes of observation, which was 2.6 at 60 minutes of observation and 2.3 at 80 minutes of observation. In a solution of 2 ml of bidara leaf extract, the larvae began to die during the 20 minute observation time of 2,3. At the observation of 40 minutes of 12.6. The highest mortality occurred in the addition of a solution of 2 ml of bidara leaf extract with an observation time of 40 minutes. It is known that the greater the addition of bidara leaf extract solution and the longer the observation time, the higher the mortality rate of Aedes aegypti larvae.

Keywords: *Aedes aegyti,* DHF, Bidara Leaves

ABSTRAK

Demam Berdarah Dengue (DBD) merupakan penyakit menular yang disebabkan oleh virus Dengue dan ditularkan melalui vektor nyamuk dari Aedes aegypti. Kasus DBD di Indonesia yang dilaporkan pada tahun 2019 tercatat sebanyak 138.127 kasus. Tujuan penelitian adalah untuk mengetahui efektivitas pemanfaatan Daun Bidara sebagai larvasida alami. Jenis penelitian ini bersifat eksperimental murni dikarenakan larva Aedes aegypti mendapat perlakuan dengan dimasukkan ke dalam larutan yang telah dicampur dengan ekstrak daun bidara dengan beberapa variasi yaitu 0,5 ml, 1 ml, 1,5 ml dan 2 ml. Lokasi pelaksanaan penelitian dilakukan di gedung Laboratorium Terpadu poltekkes kemenkes mamuju. Bagian dari tanaman bidara yang digunakan adalah daun. Ekstrak daun bidara diperoleh dengan membuat simplisia daun bidara. Berdasarkan pada tabel kematian larva diatas dapat diketahui bahwa pada larutan 0,5 ml ekstrak daun bidara tidak ada larva yang mati. Pada larutan 1 ml ekstrak daun bidara, larva mulai mati pada waktu pengamatan 40 menit dengan rata-rata kematian sebesar 2 dari setiap perlakuan. Pada pengamatan 60 dan 80 menit rata-rata kematian sebesar 2 dan 1,6 dari setiap perlakuan. Pada larutan 1,5 ml ekstrak daun bidara, larva mulai mati pada waktu pengamatan 40 menit yaitu sebesar 2,6 pada pengamatan 60 menit sebesar 2,3 dan pada pengamatan 80 menit sebesar 2,6. Pada larutan 2 ml ekstrak daun bidara larva mulai mati waktu pengamatan 20 menit sebesar 2,3. Pada pengamatan 40 menit sebesar12,6. Kematian tertinggi terjadi pada penambahan larutan 2 ml ekstrak daun bidara dengan waktu pengamatan 40 menit. Diketahui semakin besar penambahan larutan ekstrak daun bidara dan semakin lama waktu pengamatan maka tingkat kematian larva Aedes aegypti semakin tinggi.

Kata kunci: Aedes aegyti, Demam Berdarah Dengue, Daun Bidara

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the dengue virus and is transmitted through mosquito vectors of the Aedes aegypti or Aedes albopictus species. The role of vectors in the spread of disease

causes many cases to be found in the rainy season when there are many puddles of water that are breeding places for mosquitoes. In addition to climate and environmental conditions, several studies have shown that DHF is related to mobility and population density, and community behavior. These influencing factors become the basis for efforts to prevent and control DHF (1).

DHF cases in Indonesia were reported in 2019 as many as 138,127 cases. This number increased compared to 2018 of 65,602 cases. Deaths due to DHF in 2019 also increased compared to 2018 from 467 to 919 deaths. The incidence rate of dengue fever in 2019 was 51.48 from 100,000 population. This figure shows an increase compared to the previous two years, namely 2016 and 2017 when the DHF Incidence Rate was 26.1 and 24.75 from 100,000 population(1).

In 2019 West Sulawesi Province had a high DHF Case Fatality Rate of 1.01%. The high CFR requires steps to improve the quality of health services. West Sulawesi is one of the provinces that has not met the target of IR DHF < 49 from 100,000 population (1).

Data from the Health Office of West Sulawesi Province, throughout 2019 Mamuju Regency recorded 312 cases of DHF and one person died from dengue fever sufferers. The other four districts are in the alert category, namely North Mamuju, Central Mamuju, Polewali Mandar and Majene (2).

Aedes aegypti is the main vector of dengue fever (DHF). Dengue hemorrhagic fever (DHF) is a disease for which no cure or vaccine has yet been found, there is only vector control, namely by inhibiting the development of larvae and known as the mosquito nest eradication program (3)

Disease prevention that can be done is by controlling disease vectors. Vector control still uses chemical insecticides because it is effective and the results can be known quickly. The use of chemical insecticides in vector control has both positive and negative impacts. If the use of insecticides for a long time for the same target can cause the population of Aedes aegypti larvae to become resistant more quickly (4).

Ziziphuz mauritania L. has chemical constituents which include Alkaloid, polyphenols, saponins, tannins and flavonoid. The active compound is able to kill the larvae of the Aedes aegypti. The content of flavonoid compounds as respiratory poisons and the content of tannins, saponins, and alkaloids as stomach poisons. Based on preliminary tests on the juice of bidara leaves (Ziziphus spina-christi L.) the results showed that it contained 0.03% flaovonoids, 0.12|% tannins, 0.08% saponins, and 0.06% alkaloids. This shows that the chemical compounds that have the most influence in causing larval death are tannins and saponins because they have the largest percentage. However, it is possible that flavonoid and alkaloid compounds also have an effect in causing larval death (4)

MATERIAL AND METHOD

This type of research was purely experimental because the larvae of Aedes aegypti were treated by being put into a solution that had been mixed with bidara leaf extract with several variations, namely 0,5 ml, 1 ml, 1.5 ml and 2 ml.

The research was conducted at the Politeknik Kesehatan Mamuju, Jalan Poros Mamuju Kalukku in West Sulawesi KM.16 Tadui. The study is planned in Mei - Juni, 2021. The object of this research is instar III and IV Aedes aegypti larvae. The number of larvae used was 180 larvae

The part of the bidara plant used is the leaf. Bidara leaf extract is obtained by making bidara leaf simplicia. How to make simplicia is

to prepare 1 kg of bidara leaves (Zhizipuz mauriliana L.) and dry them by aerating for 3 days. After drying, the bidara leaves were weighed as much as 500 grams and then mashed with a blender. The bidara leaves are then put into a beaker then added 96% ethanol as a solvent as much as 1 liter and left for 2 days with the aim that extra bidara leaves can be formed. The treatment of bidara leaf extract was carried out with variations of 0.5 ml, 1 ml, 1.5 ml, and 2 ml, then 15 larvae of Aedes aegypti were added into 4 treatments that had been diluted and incubated for 1 hour 30 minutes. observe every 20, 40, 60, and 80 minutes

RESULT AND DISCUSSION

Based on the results of research conducted at the Integrated Laboratory of Politeknik Kesehatan Mamuju observed four observation times 20, 40, 60, dan 80 minute.

Tabel 1 Distribution of Aedes aegypti Larva Death on First Treatment

Volume Extract	N	Observation (Minute)				Total	%
		20	40	60	80		
0,5 ml	15	0	0	0	0	0	0
1 ml	15	0	2	2	2	6	40
1,5 ml	15	0	3	2	3	8	53,3
2 ml	15	2	13	-	-	15	100

Tabel 2 Distribution of Aedes aegypti Larva Death on Second Treatment

Volume Extract	N	Observation (Minute)				Total	%
		20	40	60	80		
0,5 ml	15	0	0	0	0	0	0
1 ml	15	0	2	2	1	5	33,3
1,5 ml	15	0	2	3	3	8	53,3
2 ml	15	3	12	-	-	15	100

Tabel 3 Distribution of Aedes aegypti Larva Death on Third Treatment

Volume Extract	N	Observation (Minute)				Total	%
		20	40	60	80		
0,5 ml	15	0	0	0	0	0	0
1 ml	15	0	2	2	2	6	40
1,5 ml	15	0	3	2	2	7	46,6
2 ml	15	2	13	-	-	15	100

Aedes aegypti as the vector of dengue disease can be used as one indicator of the high incidence of dengue cases. For that, we need a way to curb the high density of larvae by using bidara leaf extract as a natural larvicide to kill the larvae of Aedes aegypti.

Based on the larval death table above, it can be seen that in a 0.5 ml solution of bidara leaf extract, no larvae died. In a solution of 1 ml of bidara leaf extract, the larvae began to die at 40 minutes of observation with an average mortality of 2 from each treatment. At 60 and 80 minutes of observation, the average mortality was 2 and 1.6 from each treatment. In a solution of 1.5 ml of bidara leaf extract, the larvae began to die at 40 minutes of observation, which was 2.6 at 60 minutes of observation and 2.3 at 80 minutes of observation. In a solution of 2 ml of bidara leaf extract, the larvae began to die during the 20 minute observation time of 2,3. At the observation of 40 minutes of 12.6. The highest mortality occurred in the addition of a solution of 2 ml of bidara leaf extract with an observation time of 40 minutes. So it can be seen that the greater the addition of bidara leaf extract solution and the longer the observation time, the higher the mortality rate of Aedes aegypti larvae. Based on the results of the study, it can be seen that the higher the addition of bidara leaf extract solution, the greater the mortality of larvae. The highest percentage of larval mortality was in the addition of 2 ml extract solution, while the lowest mortality was in the addition of 0.5 ml extract solution. The length of observation time can also affect the mortality of larvae, based on the table above, the longer the observation time is carried out,

the higher the percentage of mortality of Aedes aegypti larvae. Based on the table, it can be said that the use of bidara leaf extract solution causes the death of Aedes aegypti larvae, this can be proven by observing each repetition.

The death of Aedes aegypti larvae at various concentrations was caused by active compounds that were in direct contact with Aedes aegypti larvae in the media. The higher the concentration, the more active compounds received by Aedes aegypti larvae. Larvae undergo behavioral changes. Movement that was previously active becomes sluggish, then dies. Larvae are said to be dead if there is no further movement, they are at the bottom of the water and do not come to the surface and their bodies look pale

The condition of the dead larvae can be observed with the larvae floating above the water surface at an angle of 180o. Besides that, the larva's body color becomes transparent, flattened, shrinks from its original size and does not move actively when the water is moved (5). Larval death occurs due to the impact of tannin compounds, tannins can cause a decrease in the activity of protease enzymes in changing amino acids. Tannin compounds can bind to protease enzymes that inhibit the work of these enzymes, so that cell metabolism processes can be disrupted and the larvae will lack nutrients. This can result in stunted larval growth and if this process takes place continuously it will have an impact on larval death (6). In addition, according to research conducted by Najib (2016) tannins suppress food consumption, growth rate and survival. Tannins are toxic and prevent insects from digesting food because they can bind proteins needed for larval growth. Tannins and saponins have a bitter taste so that they can cause a feeding inhibition mechanism in the test larvae. The bitter taste causes the larvae to refuse to eat so that the larvae will starve and eventually die. So it can be concluded that the longer the observation time and the higher the concentration, the higher the mortality rate for Aedes aegypti larvae instar III and IV. Because the longer the observation time and the higher the concentration, the more chemicals will enter the larva's body which causes the resistance of larvae to decrease, causing death (7).

Larval mortality is also influenced by flavonoid compounds contained in bidara leaves. In making bidara leaf extract using ethanol as a solvent that can bind secondary metabolites, especially flavonoids in bidara leaves. Flavonoids work as strong respiratory inhibitors or as respiratory toxins. Flavonoids have a way of working, namely by entering the larva's body through the respiratory system which will then cause withering of the nerves and damage to the respiratory system and cause the larvae to be unable to breathe and eventually die. The larval body position that changes from normal can also be caused by flavonoid compounds due to the way it enters through the siphon, causing damage so that the larvae must align their position with the water surface to make it easier to take oxygen. In addition there are also alkaloids that act as stomach poison. Alkaloids are in the form of salts so that they can degrade cell membranes to enter and damage cells and can also interfere with the larval nervous system by inhibiting the action of the acetylcholinesterase enzyme. The occurrence of color changes in the larval body becomes more transparent and the movement of the larva's body which slows when stimulated by touch and always bends the body is caused by alkaloid compounds(8) .

CONCLUSION

The highest mortality occurred in the addition of 2 ml of bidara leaf extract with an observation time of 40 minutes. So that it can be seen that the greater the addition of bidara leaf extract solution and the longer the observation time, the higher the mortality rate of Aedes aegypti larvae

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