Syzygium Polyanthum Wight Leaf Extract Evaluation On Aedes Spp Instar III-IV Larvae

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ABSTRACT

Aedes spp mosquitoes are the vectors that most cause diseases. The rise of insecticide resistance is related to the increasing of vectorial capacity. Plant can be used as an alternative source for controlling these vectors, one of which is Syzygium polyanthum (Wight). The present study was conducted to investigate the larvical properties of S. polyanthum leaf on Aedes spp instar III-IV. Ethanolic extract of S. polyanthum (EESP) was prepared by maceration using ethanol 70%. Larvae were divided into 7 groups (n=25, respectively). Group I to V consisted of different concentrations of EESP (100 (CI);150 (CII);200 (CIII);250 (CIV);300ppm (CV)); VI: Water (W) and VII : Temephos 1% (T). Larvical activity was evaluated by calculating the dead larva at 180, 360, 1440 and 2880 minutes to obtain Lethal Concentration 50% (LC50) and Lethal Time 50% (LT50) using Statistical Product and Service Solution (SPSS). The result showed that no larva found dead in W-treated group. Otherwise, the mortality of larva was increased with increasing of EESP concentration (CI to CV). LC50 and LT50 showed 213 ppm and 2410 minutes, respectively. We conclude that EESP has larvical activity on Aedes spp instar III-IV.

Keywords: Aedes spp, extract, larvical, Syzygium polyanthum

INTRODUCTION

Dengue fever is the most important mosquito-borne viral disease of humans1 which Aedes spp mosquitoes act as the main vectors2. Annually, it is estimated 50-100 million cases with fatality rates between 0.5 and 3.5% in Asian countries3-5. The chemical insecticides for controlling the mosquitoes cycle are known to play a role in increasing mosquitoes resistance6. Therefore, alternative source with larvical properties that obtained from plant could lead to the invention of new agents for vector control7. Plants that contained alkaloid, saponin, eugenol, flavonoids and tannin were reported able to kill Aedes aegypti larvae8, Syzygium polyanthum (S.polygonanthum), a family of Myrtaceae, is widely used in Indonesia cuisines9. The potency of this plant as larvacid has been reported by Dwiyanti et al10. Their study showed that water extract of S.polygonanthum had a killing power against Aedes sp larvae. The bioactivity of plants extracts was related to their active compounds. Thus, the solvents that used to provide plant extracts also will affect the yield of its chemical compounds. The presents study was done to investigate the larvical activity of ethanolic extract of S.polygonanthum (EESP) leaf on Aedes spp instar III-IV larvae.

MATERIAL AND METHODS

The study was conducted on August-December 2018 at Pharmacology and Therapeutic Departement, Medical Faculty, Universitas Sumatera Utara, Medan, Indonesia. Extract preparation

S.polygonanthum leaves were obtained from Titi Kuning, Medan, North Sumatera, Indonesia. The fresh leaves were washed in running water and were dried in temperature room. The dried leaves or simplicia that had been grinded were extracted by maceration using ethanol 70% to obtain ethanol extract of Syzygium polyanthum (EESP).
**Aedes spp larvae**

*Aedes spp* were obtained from Loka Litbang Kesehatan Pangandaran Ciamis, West Java, Indonesia (DP.02.01/1/831/2018).

**Experimental procedure**

The larvae were divided into 7 groups (n=25) in 200 ml water (WHO, 2005) with 4 replications of each as follows: CI (EESP 100 ppm + Larvae); CII (EESP 150 ppm + Larvae); CIII (EESP 200 ppm + Larvae); CIV(EESP 250 ppm + Larvae); CV (EESP 300 ppm + Larvae); T (Temephos 1% + Larvae) served as positive control; W (Water + Larvae). Only the active *Aedes spp* larvae instar III-IV were included in the study.

**Data analysis**

Data were analysed by Kruskall-Wallis and expressed as mean ± SD. LC50 and LT50 were calculated using probit analysis.

**RESULTS**

Table 1 shows the effect of different concentrations of EESP on *Aedes spp* larvae. The results showed that all larva were dead in T-treated group from the first observation time at 180 min which continued until 2880 min. In EESP-treated groups, the dead larvae were found at 1440 min and 2880 min observations (p<0.05). The number of dead larvae was increased that in line with the higher of EESP concentration. At 1440 min observation time at 180 min which continued until 2880 min. In EESP treated groups, the dead larvae were found. These results revealed the biolarvicidal activity of EESP after 24 hours of exposure.

**DISCUSSION**

The present study used the third and forth stage of *Aedes* mosquito larvae based on WHO standards. At these stages, the instar not only more resistant to physical and mechanical factors such as displacement, limited space for living in water, but also having enough time to turn into an adult mosquito.

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