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Received: 23 September 2019 Accepted: 18 November 2019 Published: 22 December 2019 Publishing services provided by Knowledge E Syarifah Miftahul El Jannah Selection and Peer-review under the responsibility of the ICHP Conference Committee. Conference Paper Ability Test of Acacia Nilotica Leaves and Extract As Water Disinfectants Syarifah Miftahul El Jannah1, Kuat Prabowo1, and Ferry Kriswandana2 1Environmental Health Department, Politeknik Kesehatan Kemenkterian Kesehatan Jakarta II, Indonesia 2Environmental Health Department, Politeknik Kesehatan Kemenkterian Kesehatan Surabaya, Indonesia Abstract The fulfillment of clean water that meets bacteriological requirements for urban areas is increasingly difficult due to the high contamination of groundwater by microbes. The use of chemical compounds as disinfectants always produces long-term side effects, it is necessary to develop plants that can be used as disinfectants. Acacia nilotica has the ability to kill aerobic and coliform bacteria so that it has the potential to disinfect water. The study aimed to examine the ability of leaves and extracts of A. nilotica leaves that grow in the Baluran National Park in East Java in reducing the number of aerobic and coliform bacteria in clean water used by the community. Water samples were taken from the residents of Rt 006/011 Kebayoran lama with bacteriological quality criteria Total Plate Number (TPC) above 4.0 x 10 [2]CFU and MPN Coliform> 2400 cells/100ml. The leaves of A.

nilotica are used at concentrations of 30%, 40%, and 50%, and ethanol extract of leaves of A. nilotica 5%, 7.5%, and 10% after 1 hour, 3 hours, 6 hours and 24 hours of contact. A coliform examination was performed on TPC and MPN. The yield of A. nilotica leaves was effective in reducing aerobic bacteria to 99.6% at a concentration of 50% after 24-hour contact, while leaf extract reduced the number of aerobic germs to 99.7% at a concentration of 10%. While MPN Coliform is reduced to 99.5% in the application of 50% of leaves of A. nilotica, the extract of A. nilotica can reduce coliform MPN to 100% at a concentration of 10%. Keywords: Disinfectant, water, Acacia nilotica, TPC, MPN 1. Introduction Water as one of the basic human needs must be easily obtainable and affordable. According to UN-Water (WHO-UNICEF) [1], about 780 million people in the world have no access to clean water and 80 million of them are residents of Indonesia. To meet the daily water needs, millions of these citizens make use of groundwater and rivers. Research results groundwater and rivers in DKI are known to 93 percent of river water and soil in Jakarta are exposed to the bacteria Escherichia coli. The number of these bacteria reach 2 million per 100 cubic millimeter of water, it is potentially as the cause HAsowWatotecritDeisthinifseacrtatinctlse": inSyTahreifaFhirMstifIntatehrunlaEtlioJannanlaCho,nKfeuraetnPcreaboonwHoe,aanltdh FPerorrfyesKsriioswn,aKnndEanLaif,e(2S0c1ie9n),c"eAsb,ilpitaygTeesst16o5f–A1c7a5c.iaDNOiIlo10tic.1a85Le0a2v/kelss.avn4di15E.x5t7ra5c5t Page 165 of the high cases of diarrhea in Indonesia [2]. In the year 2016 in DKI Jakarta estimated there were 274,803 cases of diarrhea, while for Indonesia found almost 6,897,463 cases (Kemenkes RI, 2017) [3] One way to minimize microbial impurities on clean water is by the use of a disinfectant in the water treatment process.Currently the chemical compound that is often used is chlorine compounds and their derivatives, but the use of chlorine in water can also react with organic compounds that are present in the water and form a chloramine substituted or organochlorine which is toxic compounds and carsinogenic effect [4]. According to Somani [5]most of the chemical disinfectant used for antibacterial activity on water treatment produces a variety of unwanted chemicals known as "Disinfections by products (DBPs)". The existence of such human impact on DBPs cancer risk hemolytic anemia, nervous system effects and liver effects, as well as relative prices are expensive. Utilization of plant extracts as alternative substitute chemical compound disinfectant in water treatment has been widely performed, one of which was Acacia (Acacia nilotica).A. nilotica. is found in Baluran National Park, East Java. This plant grows rapidly resulted in the demise of grass that became a source of feed for a variety of animals found in the National Park. Currently the Acacia invasion became a threat to the sustainability of ecosystems of the National Park and untapped by Government or community [6]. Chemical compounds in A. nilotica. include L-arabinose, catechol, galactan, galac- toaraban, Nacetyldein, kolic galactose, N-acetyldein kolic acid, pentosan sulphoxides, saponins, and tannins. The seeds contain rough protein 18.6%, 4.4% ether extract, 10.1% fiber, 61.2% nitrogen-free extract, 5.7% ash, 0.44% silica, 0.29% phosphorus, and 0.9% calcium [7]. High tannin content in all parts of the plant. Inside the pods 5.4%, 7.6% of leaves, 13.5% of bark, and twigs 15.8%. Total polifenolik in fruit range 30-60% [8]. Angela, et. Al. [9] get saponins, flavonoids, phenols, terpenoids, tannins, carbohy- drates and steroids in leaves extracts of A. nilotica.. Most of the genus acacia is rich in secondary metabolites of compounds such as tannins, flavonoids and gum [10]. A. nilotica. is rich in polyphenols compounds formed from condensation of tannins with phlobatannin became gallic acid, ellagicacid, (þ)-catechin and (-)-epigallocatechin-7- gallate [11]. The leaves of A. nilotica. have the ability as a Chemopreventive, antimu-tagenic, anti-bacterial, astringent, antimicrobial, anticancer activity and

gastrointestinal [12] Research Kirui, Kotut and Okerno [13] against various types of plants, getting the extract of leaves of A. nilotica. delivers 99.6% effective lowering the number of bacterial colonies, besides leaf extract of A. nilotica. doesn't change the taste of the water. This makes A. nilotica. potentially developed as water disinfectant The specific objectives of this study were Get the chemical compounds contained in A. nilotica. leaf extract and its ability to decrease the number of aerobic bacteria, Total Coliform, the length of time the maximum exposure is needed to lower the number of aerobic bacteria and Coliform. 2. Materials and Methods 2.1. Plant and extraction leaves Acasia nilotica taken from Baluran National Park, East Java region of savanna Bekol. The leaves are taken from a one-year-old plant, a total of approximately 20 kg, dried and made to extract with ethanol solvent. Then conducted the examination of chemical compounds. The checks carried out in the laboratory of Herbal medicine Faculty of Pharmacy UI. 2.2. Water source Water samples taken in the area of RW 011 RT 006, Kelurahan Kebayoran Lama, South Jakarta, from three different sources, each of five liters. In this area the community are still using ground water, whose quality of microbiological have yet to eligible, total plate count (TPC) more than 4.0 x10 [2] CFU/ml and total Coliform (fecal and non fecal) more than 240 cells/100 ml. 2.3. Treatment Prepared seven container filled with one liter water, at A, B and C are added the dried leaves of A. nilotica. by as much as 30%, 40% and 50%. On the container D, E and F are added extracts of leaves of A. nilotica. with a concentration of 5%, 7.5% and 10%. While the container G is not added to the leaves or the leaf extract of A. nilotica.. Homogenization is done using a glass stirrer/stenles steel, wait up to 1 hour, then 100 ml water sample taken for microbiological examination (TPC and MPN) which refers to the SNI. The same thing is done after 3 hours, 6 hours and 24 hours. 3. Results and Discussion From the results of the identification of active ingredients made in the laboratory for biological test of material nature, Faculty of Pharmacy of the University of Indonesia. From 1 kg of leaves of A. nilotica. dried and extracted with ethanol obtained the amount of extract 38gr with 16.9% extraction yield, at the got active ingredients like the following table: Table 1: Identification of the Active Ingredients in Leaves and Extract Leaves Of Acacia nilotica. No Identification 1 Total Phenol 2 Total flavonoid 3 Phytochemical screening a. Alkaloid b. Flavonoid c. Tanin d. Saponin e. Terpenoid f. Antraquinon g. Glicosida Result 42,15 mg in 1 gram extract 9,06 mg in 1 gram extract -/Negatip +/Positip +/Positip +/Positip +/Positip -/Negatip +/Positip 3.1. Total plate count The leaves of A. nilotica. has the ability to decreased the number of aerobic and facultative aerobic bacteria. On the application to use the dried leaves, before the addition of leaves A. nilotica. result of TPC 22,043 CFU/ml, the highest loss occurred up to 99.6% at concentrations of 50% after 24 hours. the leaves of A. nilotica. is able to decreased minimal 88.6% at a concentration of 30% after 1 hour. (Fig 1, 2) The percentage decrease in Average Total plate count on the application of leaf Acacia nilotica a concentration of 30%, 40% and 50% with Contact Time of 1 hour, 3 hours, 6 hours and 24 hours In a third concentration statistic leaves A. nilotica. is capable of lowering the value of TPC with the same capabilities/no different (sig 0,184 > 0.05), as well as the time of contact (sig 0.698 > 0.05). The active ingredients found in the concentration of third leaf has the same ability to kill germs are aerobic and aerobic fakultatip The results of Total Plate count on water with Added Acacia nilotica Leaf concentra- tion of 30%, 40%, 50% with Contact of 1 hour, 3 hours, 6 hours and 24 Figure 1 Figure 2 A. nilotica. leaf extract ability to decreasing bacteria aerobic and aerobic facultatip reaches 99.7% at a concentration of 10% with a 24-hour contact time. At concentrations of 5% with only 1 contact hour been going decreaseduntil 56%. (Fig 3) Of the three samples water have seen decrease in the number of germs that are quite significant,

on a high concentration decrease looks more as well on a long contact time. Average decline in concentrations of 5% of the time one hour contact TPC of 1508 CFU/ml, after a 24-hour contact TPC be 238 CFU/ml. While in the concentration of 7.5% after 24 hours contact HJK only 30 CFU/ml (fig. 4). It's been shown leaf extract was able to decrease bacateri aerob and facultatip aerob very well. Figure 3 The percentage decrease in Average Total plate count on the application of Extract Leaf Acacia nilotica a concentration of 5%, 7,5% and 10% with Contact Time of 1 hour, 3 hours, 6 hours and 24 hours Figure 4 The results of Total Plate count on water with Added extract leaf Acacia nilotica concentration of 30%, 40%, 50% with Contact of 1 hour, 3 hours, 6 hours and 24 In statistics proved extracts of A. nilotica. significantly (sig 0.00 < 0.05) has the ability to decline the number of bacteria aerobic and aerobic facultatip. The higher the concentration and time to contact, the higher ability to reduce TPC. Decline of TPC on the leaves faster than extract, this is possible because on the leaves in addition to the active ingredients which are antimicrobial, there are also elements such as minerals, salts or inorganic compounds that can inhibit or kill bacteria. Abbasian40 in his research get metals such as Cu, Fe, Zn, K, Mn, Co, Ca, Mg, Na, Se, Li and Mo, where metals and minerals are bakterisid and bacteriostatic. Whereas, in the leaf extract that elements relativedo not found. Mpn Coliform Previous researchers have proved that the leaves of A. nilotica. has the ability to inhibit the growth of bacteria Escherichia coli. Rahman, et al (2014) [14] gets 29 mm inhibition zone on the use of the extract concentration 15 mg/ml. as for positive Gram bacteria (S. aureus and B. subtilis) zone barrier not too large. Kalaivani and Mathew research (2010) [15] says the extract of A. nilotica. have a great ability to inhibit the growth of bacteria E. coli, S. aureus and Salmonella typhi. Figure 5 The percentage decrease in Average MPN Coliform on the application of leaf Acacia nilotica a concentration of 30%, 40% and 50% with Contact Time of 1 hour, 3 hours, 6 hours and 24 hours The amount of the total Coliform before the application is 4,800 cells/100 ml, after given leaves of A. nilotica. , at a concentration of 30% decline's seen after 3 hours contact, whereas at concentrations 50% decrease has occurred despite a 1 hours contact, the largest decline seen on concentration 50% where the 24-hour contact time, MPN Coliform only 26 cells/100 ml (Fig 5,6) Figure 6 The results of MPN Coliform on water with Added Acacia nilotica Leaf concentration of 30%, 40%, 50% with Contact of 1 hour, 3 hours, 6 hours and 24 hours Concentration of the extract of the leaves of A. nilotica. which applicated lowest is 5%, in the first hour been MPN Coliform going decline and still continuedecline with the increasing concentration of extracts and time of contact. At concentrations extract 10% are able to decreasedMPNColiform until 100%. (Fig. 7). The results of MPN Coliform on water with Added extract leaf Acacia nilotica con- centration of 30%, 40%, 50% with Contact of 1 hour, 3 hours, 6 hours and 24 The Coliform bacteria is Gram negative, belonging to the family enterobacteriaceae. Gram negative bacteria wall largely made up of lipids this gives ease for flavonoid active to penetrate the membrane of bacteria because lipophilic in nature, so flavonoids have ability to kill against Gram negatip bacteria Figure 7 Overall it looks that the ability of extract A. nilotica. leaf much better to decreased MPN Coliform than the leaves of a. niotica. The leaf extract contains ingredients active are antibacterial will work faster than in the leaves. Figure 8: Change colour in water after added extract A nilotica. 4. Conclusions The leaves and the extract of the leaves of A. nilotica. originating from Baluran National Park, East Java, is capable to decreases the value of TPC and MPN Coliform. The effective concentration of leaves is 50% with 24-hour contact and the leaf extract is 10% with a 24 hour contact. The occurrence of a change of color make this extract could not directly used. Acknowledgments Director of poltekkes kemenkes Jakarta II and the citizens of RT, RW 006 011 Kebayoran

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