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ANTIMICROBIAL POTENCY OF *PASSIFLORA FOETIDA* LINN FROM SOUTH SULAWESI INDONESIA AGAINST BACTERIA IN VITRO

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Abstract

This study aims to investigate the antimicrobial potency of *Passiflora foetida* Linn against some bacteria and determine the minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC). The screening test for antimicrobial was performed against bacteria *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Staphylococcus aureus*, *Streptococcus mutans*, *Shigella dysenteris*, and *Vibrio cholera*. The MIC and MBC were tested at concentrations of 0.1%, 0.2%, 0.4%, 0.8% and 1.6%. Based on the observations the antimicrobial screening that provide inhibition are ethanol extract and ethyl acetate fraction. The MICs against bacteria *Bacillus subtilis* (BS), *Staphylococcus aureus* (SA) and *Salmonella typhi* (ST) are shown at concentrations of 0.4%, 0.8% and 1.6%. The MBCs, by using the same bacteria, show the concentrations of 0.8% and 1.6% in the bacteria *Bacillus subtilis* and *Salmonella thypi*, while the *Staphylococcus aureus* bacteria give MBCs at all concentrations test.

Keywords: antimicrobial potency, bacteria, in vitro, *Passiflora foetida* Linn.

Introduction

Infectious diseases are the most widely type of illness suffered by the population in developing countries, including Indonesia. One cause of infectious disease is bacteria. The bacteria are microorganisms that can not be seen with the naked eye, can be seen only by a microscope. A large number of drugs of various medicinal plants have the potential therapeutic [1]. Searching some compounds that have potency as an antibacterial have been carried out of asplenium nidus for antibacterial, cytotoxic, and antiviral activities [2]. Microorganisms can produce antibiotic compounds that can inhibit or bactericidal other microorganisms [3]. Antimicrobial research has also been carried out with the

chemical compound resuvastatin and isolation of bacteria producing antibiotics [4,5]. A natural compound has potency as an antibacterial generally contain steroids, tannins, polyphenols, and flavonoids [6]. *Passiflora foetida* Linn is one of the family members of passifloraceae plants which are found in South Sulawesi Indonesia. Based on research studies of free antiradical by using DPPH, *Passiflora foetida* Linn has potential as antioxidants with IC₅₀ values of 1.0004 mg/ml and effective dose at 400 mg/kgbw in rat hepatic [7,8]. Selection of solvent used in the extraction of bioactive compounds is an important factor that affects the therapeutic potential. Ethanol with a lower polarity than water, can dissolve the alkaloids, diglikosida, phenolics, flavonoids and volatile oil slight [9,10]. This study aims to investigate the antimicrobial potency of *Passiflora foetida* Linn against some bacteria and determine the minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC).

Materials and Methods

Materials

The materials used are *Passiflora foetida* Linn from South Sulawesi Indonesia and some bacteria: *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella thypy*, *Staphylococcus aureus*, *Streptococcus mutans*, *Bacillus subtilis* and *shigella disentriga*. The bacteria are obtained from Laboratory of Microbiology of Faculty of Pharmacy, Universitas Muslim Indonesia.

Preparation of material

Dried simplicia of *Passiflora foetida* Linn herb is extracted by maceration by immersing the simplisia in an organic solvent ethanol 80%. Furthermore, the extract that obtained followed by fractionation.

Antibacterial potency test:

The concentration of 10% *Passiflora foetida* Linn is dissolved in 0.2 mL DMSO. Furthermore, they are poured into a petri dish, added 9.8 mL of medium NA then homogenized and allowed to solidify. The suspension of bacteria inscribed on NA medium which has been solidified and then incubated at 37 °C for 1 x 24 hours.

Minimum inhibitory concentration (MIC) test

Samples are made into some variations in concentration. They are 0.1%, 0.2%, 0.4%, 0.8%, and 1.6%. The next, each concentration is put in sterile test tube then added medium Nutrient Broth (NB). After that, bacterial suspension test are inserted in each test tube then incubated at 37⁰C for 24 hours. The lowest concentration which shows the solution remains clear is the value of MICs.

Minimum bactericidal concentration (MBC) test

The result of incubation from MIC test is streaked on Nutrient Agar (NA) medium in a petri dish, then incubated at a temperature of 37°C for 24 hours. MBC value is shown in the lowest concentration where no bacterial growth.

Results and Discussion

Antimicrobial screening uses 8 bacteria. They are *Salmonella typhi* (ST), *Streptococcus mutans* (SM), *Vibrio Sp* (V), *Pseudomonas aeruginosa* (PA), *Staphylococcus aureus* (SA), *Escherichia coli* (EC), *Bacillus subtilis* (BS), and *Shigella dysenteries* (SD). The antimicrobial screening shows inhibition effect of the ethanol extract and ethyl acetate fraction. The screening results can be seen in Figure 1 and Table 1.

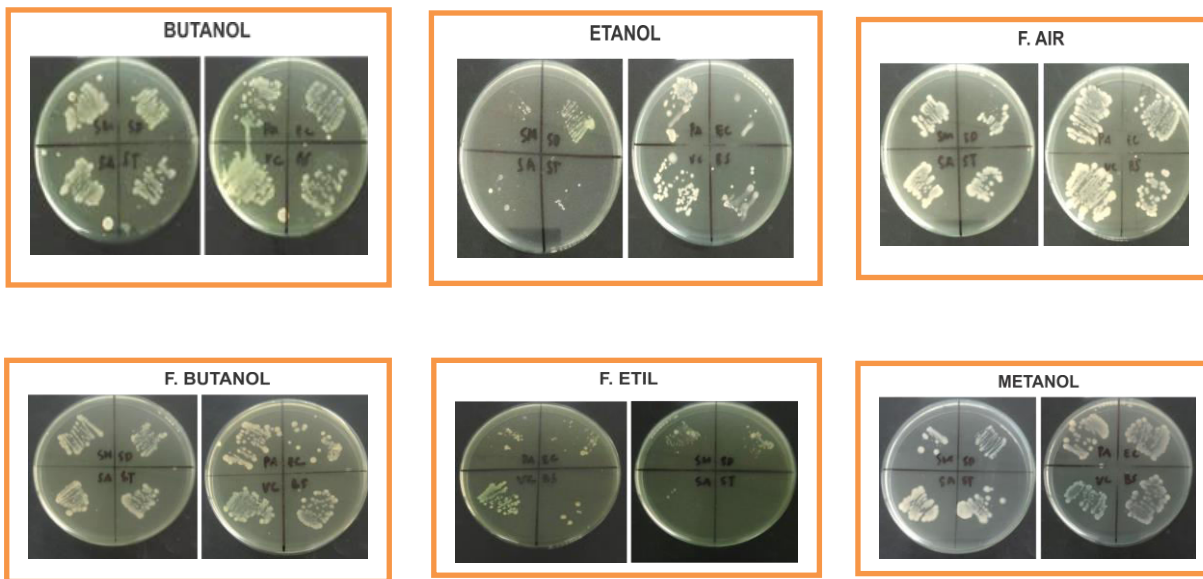


Figure 1: Scanned pictures of antimicrobial screening.

Table-1: Antimicrobial screening.

No.	Sample	Bacteria							
		ST	SM	VC	PA	SA	EC	BS	SD
1	F. Butanol	-	-	-	-	-	-	-	-
2	Etanol	+	+	-	-	+	-	-	-
3	Metanol	-	-	-	-	-	-	-	-
4	Butanol	-	-	-	-	-	-	-	-
5	F. Etil	+	-	-	-	+	-	+	-
6	F. Air	-	-	-	-	-	-	-	-

Remarks:

- = Not Inhibitory

+ = Inhibitory

MIC test uses 5 concentrations. They are 0.1, 0.2, 0.4, 0.8, and 1.6. Figure 2 and Table 2 show the concentration of 0.4%, 0.8%, and 1,6% provide power to the minimum inhibitory against test bacteria: *Bacillus subtilis* (BS), *Staphylococcus aureus* (SA), and *Salmonella Typhi* (ST).

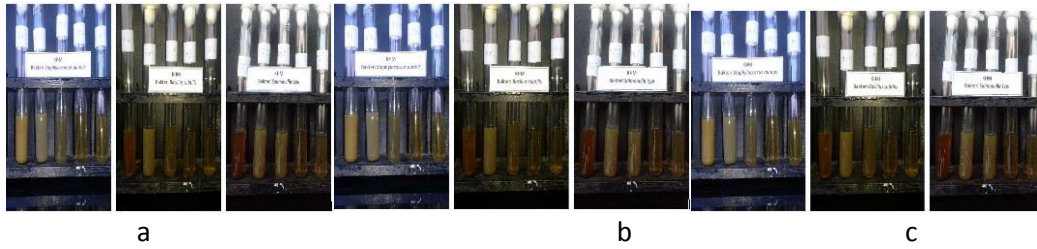


Figure 2: Scanned pictures of MIC test of ethyl acetate fraction
a. *Bacillus subtilis* (BS); b. *Staphylococcus aureus* (SA); c. *Salmonella typhi* (ST)

Table-2: MIC test results.

No.	Bacteria Test	Concentration (%)				
		0.1	0.2	0.4	0.8	1.6
1	BS	-	-	+	+	+
2	SA	-	-	+	+	+
3	ST	-	-	+	+	+

Remarks:

- = Not Inhibitory

+ = Inhibitory

The observation of the MBC test by using the same bacteria shows the bacteria *Bacillus subtilis* and *Salmonella typhi* give the MBC at the concentration of 0.8 % and 1.6 % in, while for the bacteria *Staphylococcus aureus* at all test concentrations. The MBC test results can be seen in Figure 3 and Table 3.

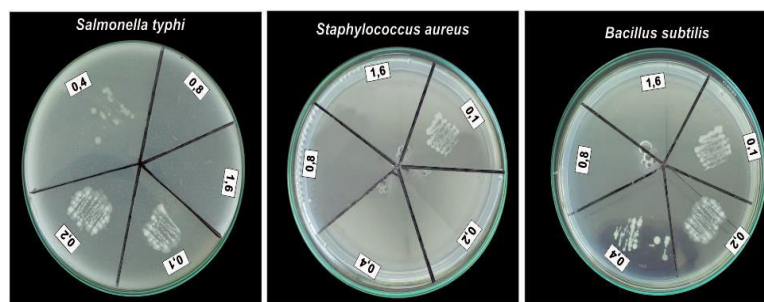


Figure-3: Scanned pictures of MBC test of ethyl acetate fraction.

Table-3: MBC test results.

No.	Bacteria Test	Concentration (%)				
		0.1	0.2	0.4	0.8	1.6

1	BS	-	-	-	+	+
2	SA	-	+	+	+	+
3	ST	-	-	-	+	+

Conclusion

Ethyl acetate fraction for MIC test gives inhibition of the test bacteria *Bacillus subtilis*, *Staphylococcus aureus* and *Salmonella typhi* at concentrations of 0.4%, 0.8%, and 1.6%. Furthermore, MBC test provides the potential for antimicrobials in bacteria *Bacillus subtilis* and *Salmonella typhi* at concentrations of 0.8% and 1.6%, while *Staphylococcus aureus* at concentrations of 0.2%, 0.4%, 0.8% and 1.6%.

Acknowledgement

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