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Asian Journal of Pharmaceutical Research and Development

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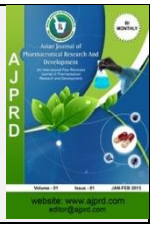

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Research Article

Antibacterial and Antifungal Activities of Patikan Kebo (*Euphorbia Hirta* L.) Herb Ethanol Extract

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A B S T R A C T

Objective: The aim of this study was to determine the content of secondary metabolites, and the concentration of extracts that were effective as antibacterial and antifungal agents.

Methods: The research method was carried out experimentally with several stages; making Simplicia, Simplicia characterization, maceration, phytochemical screening, making test solutions, and testing antibacterial and antifungal activities.

Results: The results of phytochemical screening of the ethanol extract of the patikan kebo herb (*Euphorbia hirta* L.) showed the existance of alkaloids, flavonoids, saponins, tannins, and steroids/triterpenoids. Furthermore, the results of the antibacterial and antifungal activity test showed that the ethanol extract of the patikan kebo herb showed the diameter of the inhibition zone in the Strong category as the concentration increased.

Conclusion: The herbal extract of patikan kebo (*Euphorbia hirta* L.) has antibacterial and antifungal activity so that it has potential as a natural antibiotic.

Keywords: Ethanol, Extract, *Euphorbia hirta* L, antibacterial, antifungal

A R T I C L E I N F O: Received 06 May 2021; Review Complete; 03 August 2021 Accepted; 24 Sept. 2021 Available online 15 Oct. 2021

Cite this article as:

Simanjuntak HA, Rahmiati R, Antibacterial and Antifungal Activities of Patikan Kebo (*Euphorbia Hirta* L.) Herb Ethanol Extract, Asian Journal of Pharmaceutical Research and Development. 2021; 9(5):06-09. **DOI:** http://dx.doi.org/10.22270/ajprd.v9i51017

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INTRODUCTION

Infectious diseases are one of the most critical health problems in the world. Infectious diseases are diseases caused by groups of organisms such as bacteria, viruses, protozoa, fungi, and worms[1]. These occur when pathogenic organisms invade host cells and cause symptoms or responses such as fever and inflammation. Several types of microorganism can cause pathogens such as *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Salmonella typhi*, *Escherichia coli*, *Candida albicans* and *Pityrosporum ovale* groups of fungi. One treatment that is often used is antibiotics administration to cure infectious diseases.

The use of antibiotics that are not in accordance with the rules of use will lead to antibiotic resistance. Resistance occurs when the microbe undergoes adaptation changes that reduce or eliminate the effectiveness of the drug. As a result it can lead to several fatal consequences such as prolongation in treatment. Therefore, an alternative is needed in this treatment using natural ingredients such as those from the patikan kebo plant (Euphorbia hirta L.).

Previous research reported that the ethanolic extract of *Euphorbia hirta* root could inhibit the growth of *Propionibacterium acnes*, *Staphylococcus epidermidis*[2], while the methanol extract of *Euphorbia hirta* root and stem showed antibacterial activity against *Staphylococcus aureus*[3], and the ethanolic extract of *Euphorbia hirta* leaf showed a significant antibacterial effect against *Escherichia coli* bacteria, *Klebsiella pneumonia*, *Shigella dysentriae*, *Salmonella typhi*, and *Proteus mirabilis*[4]. The antifungal activity has been carried out with ethyl acetate solvent leaf

extract which has antifungal activity against *Aspergillus flavus*[5]. Based on the literature, it is necessary to conduct research on the antibacterial and antifungal activity of the ethanol extract of the patikan kebo herb (*Euphorbia hirta* L.).

METHODS AND MATERIALS

Sample Preparation

The patikan kebo plant (*Euphorbia hirta* L.) used is all parts of the plant. Sampling was done purposively. The sample was taken from Simalingkar Village, Medan Tuntungan District, Medan City, North Sumatra, Indonesia. Plants identified by Herbarium Medanense Universitas Sumatera Utara (No.6116/MEDA/2021).

Extract Preparation

A total of 600 grams of patikan kebo herb simplicia powder (*Euphorbia hirta* L.) was extracted using maceration method with 96% ethanol as solvent. Maceration was carried out by soaking the simplicia herbal patikan kebo (*Euphorbia hirta* L.) for 3 days with occasional stirring. The procedure is repeated until the maserate is colorless (clear). The results of the maceration (maserat) were thickened using a rotary evaporator so that a thick extract of the patikan kebo herb (*Euphorbia hirta* L.) was obtained. Then the percent yield was calculated.

Phytochemical Screening

Phytochemical screening tests were carried out on herb patikan kebo extract (*Euphorbia hirta* L.) to determine the presence of secondary metabolite compounds such as alkaloids, flavonoids, saponins, tannins, and steroids/triterpenoids.

Antibacterial Test and Antifungal Test

Determination of antibacterial and antifungal activity tests was carried out by sterilizing tools and materials beforehand, making media (MHA and PDA), making bacterial and fungal suspensions, making concentrations of extracts of the patikan kebo (*Euphorbia hirta* L.) herb. Preparation of sterile MHA media for antibacterial and PDA for antifungal was put as much as 20 ml into sterile petri dishes, then allowed to solidify. Take 1 ose suspension of bacteria (*Staphylococcus epidermidis*, *Escherichia coli*), fungi (*Candida albicans*), then scratched on the media evenly. Then put the concentration of paper disc soaks (75%, 50%, 25%, 12.5%, chloramphenicol/ketoconazole, and DMSO) on the media. Then all cultures were incubated at 37^{o}C at 1 x 24 hours. Observations were made by measuring the diameter of the inhibition zone formed around the paper disc using a caliper. The results of the observation of the diameter of the inhibition zone were analyzed descriptively based on Davis and Stout criteria[6].

RESULTS AND DISCUSSION

Phytochemical Screening

The results of phytochemical screening show that there are secondary metabolite components found in the patikan kebo herb extract can be seen in table 1.

Table 1: Results of Phytochemical Screening of Patikan Kebo (*Euphorbia hirta* L.) Herb Extract.

No.	Screening	Reagent	Patikan Kebo Extract
1	Flavonoid	Mg + HCl + Amil Alkohol	Positive
2	Alkaloid	Mayer	Positive
		Bouchardat	Positive
		Dragendorff	Positive
3	Saponin	Foam Test	Positive
4	Tanin	$FeCl_3$ 1%	Positive
5	Steroid/Triterpenoid	Lieberman-Buchard	Positive

Based on Table 1. shows that the secondary metabolites contained in the herbal plant patikan kebo consist of alkaloids, flavonoids, saponins, tannins and steroids/triterpenoids. This is in accordance with previous studies explaining that the results of phytochemical screening from ethanolic extracts of patikan kebo leaves and flowers consist of alkaloids, flavonoids, terpenoids, tannins, saponins and carbohydrates[7], meanwhile, the methanol and hydro-alcohol extracts (70%) consisted of tannins, saponins, quinines, terpenoids, steroids, flavonoids, phenols, glycosides, cardiac glycosides[8]. The results of phytochemical screening of *Euphorbia hirta* herbs were mostly found in ethanol solvents consisting of alkaloids, flavonoids, glycosides, polyphenols, phenolics, steroids and terpenoids[9].

Antibacterial and Antifungal Activity Test Results

The test results of antibacterial and antifungal activity can be seen from the diameter of the inhibition zone on the growth of bacteria (*Staphylococcus epidermidis*, *Escherichia coli*), and Fungi (*Candida albicans*) in table 2 and figure 1.

Tabel 2: Result of Inhibition Zone Diameter of Patikan Kebo (*Euphorbia hirta* L.) Herb Ethanol Extract

Sample	Inhibition Zone Diameter (mm)		
	S.epidermidis	***E.coli***	***C.albicans***
75%	18.78	18.47	14.17
50%	15.88	14.87	13.72
25%	13.20	12.50	12.89
12,5%	11.40	10.84	11.22
Chloramphenicol	30.07	31.24	-
Ketokenazole	-	-	33.97
DMSO	0	0	0

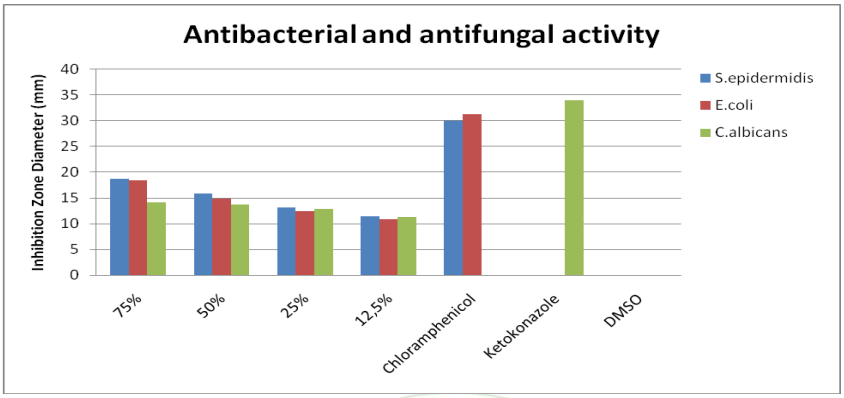

Figure 1: Antibacterial and antifungal activity of ethanol extract of patikan kebo herb

Based on Table 2 and Figure 1. it can be seen that the ethanol extract of the patikan kebo herb has antibacterial and antifungal activity at a concentration of 12.5%; 25%; 50%; and 75% with Strong category. Based on Davis and Stout[6], explained that there are criteria for antimicrobial power based on the diameter of the inhibitory zone, namely <5 mm in the Weak category, the inhibition zone of 5-10 mm in the Medium category, the inhibition zone of 10-20 mm in the Strong category, while the inhibition zone is >20 mm or categorized as Very Strong. The ethanol extract of the patikan kebo herb contains secondary metabolites that act as antimicrobials.

Based on the results of phytochemical screening in table 1, it shows that the ethanol extract of the patikan kebo herb contains secondary metabolites such as alkaloids, flavonoids, saponins, tannins and steroids/triterpenoids. The presence of these compounds is responsible for the pharmacological effects[10], especially as antimicrobials such as flavonoid compounds (quercetin, epigenin flavones), alkaloids, triterpenoids, and saponins.

Flavonoid compounds such as quercetin and epigenin have been known to have antibacterial activity through the mechanism of inhibiting bacterial enzymes (tyrosine-tRNA synthetase), changing cytoplasmic membrane function, inhibiting nucleic acid synthesis (DNA gyrase from *E. coli*), increasing antibiotic susceptibility, decreasing cell attachment, Inhibits energy metabolism, biofilm formation, changes in membrane permeability, reduces pathogenicity, damages the cytoplasmic membrane and leads to leakage of intracellular components[11]. In addition, there are flavone compounds that act as antibacterial. The mechanism of action of flavones as antibacterial is by forming complex cell wall components that inhibit further adhesion of microbial growth. The presence of licoflavone C is active against *Escherichia coli* bacteria by forming extracellular protein complexes[12].

Alkaloids have antimicrobial potential by damaging cell wall constituents such as peptidoglycan through DNA accelerator components and inhibiting topoisomerase enzymes. Saponins are plant glycosides that have antimicrobial effects. Saponins cause cell lysis through leakage and breakdown of Alkaline Phosphate (AKP)[13,14].

The triterpenoid compounds in the patikan kebo extract have been isolated, namely tetracyclic triterpenoids (tirucallane, euphane, lanostane, and cycloartanes), pentacyclic triterpenoids (lupane, oleanane, taraxarane, friedoursane, friedelane, ursane triterpenoids, eupulcherol A)[15]. The compounds taraxarane and 11α, 12α-oxidotaraxerol were reported to have antibacterial and antifungal activity[16].

Based on research that has been done that the ethanolic extract of patikan kebo leaves has activity in inhibiting the growth of several fungi such as: *Aspergillus niger*, *Aspergillus fumigatus*, *Aspergillus flavus*, and *Rhizopus oryzae*, *Colletotrichum capsici*, *Fusarium pallidoroseum*, and *Botryodiplodia theobromae*[17]. The antifungal from Euphorbia hirta flower ethyl acetate has the potential to target cell membranes that can cause cellular protein leakage[5].

CONCLUSIONS

Based on research that has been carried out, it can be concluded that the ethanol extract of the patikan kebo herb has antibacterial and antifungal activity at all concentrations of the extract with the Strong category.

ACKNOWLEDGMENTS

The author would like to thank the Direktorat Riset and Pengabdian Kepada Masyarakat – Jenderal Penguatan Riset and Pengembangan – Kementerian Pendidikan, Kebudayaan, Riset and Teknologi Republik Indonesia which provides funding Hibah Penelitian Dosen Pemula.

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