AKTIVITAS ANTIBAKTERI KOMBUCHA DAUN SIRSAK (*Annona muricata* Linn.) PADA BAKTERI *Escherichia coli* DAN *Salmonella typhi*

SKRIPSI

Untuk Memenuhi Persyaratan
Memperoleh Gelar Sarjana Kedokteran

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RINGKASAN

Kalyana Palupi. Fakultas Kedokteran, Universitas Islam Malang, Oktober 2021. Aktivitas Antibakteri Kombucha Daun Sirsak (*Annona muricata* Linn.) Pada Bakteri *Escherichia coli* dan *Salmonella typhi*. **Pembimbing 1**: Dini Sri Damayanti. **Pembimbing 2**: Reza Hakim

Pendahuluan: Kombucha sebagai minuman fermentasi yang bersifat probiotik, yang bahan dasarnya dapat diganti dengan daun sirsak. Salah satu syarat probiotik adalah memiliki aktivitas antibakteri. Daun sirsak telah terbukti memiliki aktivitas antibakteri. Tujuan penelitian ini adalah untuk mengetahui aktivitas antibakteri kombucha daun sirsak (*Annona muricata* Linn.) terhadap bakteri *Escherichia coli* dan *Salmonella typhi.*

Metode: Kombucha daun sirsak di buat dengan merebus 1000 mL air, 100 gram gula pasir dan 5 gram serbuk daun sirsak selama 5 menit. Kemudian di tambahkan 24 gram *Symbiotic Culture of Bacteria and Yeast* (SCOBY) dan di fermentasi selama 14 hari. Kombucha diambil dan diencerkan pada konsentrasi 25, 50 dan 100% dilakukan uji zona hambat dengan pengulangan 3 kali. Zona hambat diukur dengan metode difusi tipe sumuran. Pengukuran zona hambat menggunakan aplikasi *software OptiLab* versi 1,5. Analisa data menggunakan uji *One Way ANOVA* yang dilanjutkan dengan *Post-Hoc Tukey* dengan signifikansi p <0,05.

Hasil dan Pembahasan: Daya hambat kombucha daun sirsak konsentrasi pada 25, 50, 100% terhadap *Escherichia coli* secara berturut-turut adalah sebagai berikut 7,3±0,9; 9,2±0,8; 12,3±0,3 mm (p=0,05). Sedangkan gentamisin mampu menghambat pertumbuhan *Escherichia coli* sebesar 14,7±1,2 mm. Sedangkan daya hambat kombucha daun sirsak kosentrasi pada 25, 50, 100% terhadap *Salmonella typhi* secara berturut-turut adalah 5,23±3,7; 8,47±0,3; 10,36±0,7 mm (p=0,05). Sedangkan gentamisin mampu menghambat pertumbuhan *Salmonella typhi* sebesar 11,3±1,6 mm. Hal ini terjadi karena kombucha daun sirsak mengandung asam organik (asam asetat, asam glukonat dan asam laktat), etanol, flavonoid dan bakteri asam laktat yang mampu menghambat pertumbuhan bakteri patogen.

Kesimpulan: Kombucha daun sirsak konsentrasi 100% efektif menghambat *Escherichia coli* dengan derajat kuat. Sedangkan kombucha daun sirsak konsentrasi 50% efektif menghambat pertumbuhan *Salmonella typhi* dengan derajat kuat. Kombucha daun sirsak lebih efektif menghambat *Salmonella typhi* dibandingkan *Escherichia coli.*

Kata Kunci: Kombucha, *Annona muricata* L, *Escherichia coli, Salmonella typhi*

SUMMARY

Kalyana Palupi. Faculty of Medicine, University of Islam Malang, October 2021. Kombucha Antibacterial Activity of Soursop Leaf (*Annona muricata* Linn.) on *Escherichia coli* and *Salmonella typhi* Bacteria. **Supervisor 1**: Dini Sri Damayanti. **Supervisor 2**: Reza Hakim

Introduction: Kombucha is a probiotic fermented drink, the basic ingredients of which can be replaced with soursop leaves. One of the requirements for probiotics is to have antibacterial activity. Soursop leaves have been shown to have antibacterial activity. The purpose of this study was to determine the antibacterial activity of soursop leaf kombucha (*Annona muricata* Linn.) against *Escherichia coli* and *Salmonella typhi.*

Method: Soursop leaf kombucha is made by boiling 1000 mL of water, 100 grams of sugar and 5 grams of soursop leaf powder for 5 minutes. Then 24 grams of Symbiotic Culture of Bacteria and Yeast (SCOBY) were added and fermented for 14 days. Kombucha was taken and diluted at concentrations of 25, 50 and 100%. Inhibition zone test was performed with 3 repetitions. The zone of inhibition was measured by the well type diffusion method. Inhibition zone measurement using OptiLab version 1.5 software application. Data analysis used One Way ANOVA test followed by Post-Hoc Tukey with a significance of $p < 0.05$.

Result and Discussion: The inhibitory power of soursop leaf kombucha at concentrations of 25, 50, 100% against *Escherichia coli*, respectively, was 7.3±0.9; 9.2±0.8; 12.3±0.3 mm (p=0.05). Meanwhile, gentamicin was able to inhibit the growth of *Escherichia coli* by 14.7 ± 1.2 mm. Meanwhile, the concentration of kombucha in soursop leaves at 25, 50, 100% against *Salmonella typhi* was 5.23±3.7; 8.47±0.3; 10.36±0.7 mm (p=0.05). Meanwhile, gentamicin was able to inhibit the growth of *Salmonella typhi* by 11.3 ± 1.6 mm. This happens because soursop leaf kombucha contains organic acids (acetic acid, gluconic acid and lactic acid), ethanol, flavonoids and lactic acid bacteria which can inhibit the growth of pathogenic bacteria.

Conclusion: Soursop leaf kombucha with 100% concentration effectively inhibited *Escherichia coli* with a strong degree. Meanwhile, soursop leaf kombucha with a concentration of 50% was effective in inhibiting the growth of *Salmonella typhi* with a strong degree. Soursop leaf kombucha is more effective at inhibiting *Salmonella typhi* than *Escherichia coli.*

Keyword: Kombucha, *Annona muricata* L, *Escherichia coli*, *Salmonella typhi*

BAB I
PENDAHULUAN

1.1 Latar Belakang

Penyakit diare merupakan penyakit endemis di Indonesia dengan potensial kejadian luar biasa (KLB) yang tinggi (Kementerian Kesehatan RI, 2019). Prevalensi diare menurut Kemenkes RI mengalami peningkatan pada tahun 2018 dari tahun 2017 (Kementerian Kesehatan RI, 2019). Data menurut Parija (2012), terdapat 600 juta orang terinfeksi bakteri *Escherichia coli* dengan angka kematian 700.000 pertahun, sedangkan *Salmonella typhi* menginfeksi sekitar 13 juta pasien dengan angka kematian 600.000 pertahun (Parija, 2012). Kedua bakteri ini sering menjadi masalah di negara berkembang seperti India, Afrika, Timur Tengah, Amerika Selatan dan Asia Ternggara termasuk Indonesia (Parija, 2012), sehingga penanganan diare akibat infeksi bakteri *Escherichia coli* dan *Salmonella typhi* perlu di perhatikan.

Terapi antibiotik merupakan pengobatan lini pertama penyakit infeksi (WHO, 2017). Namun penggunaan antibiotik yang tidak benar seperti mengkonsumsi dalam jangka waktu yang panjang mengakibatkan penurunan normal flora (*Bifidobacterium*, *Lactobacillus* dan *Bacteroides*) dan peningkatan mikroba patogen seperti bakteri Gram-negatif enterik aerob (Noverr and Huffnagle, 2013). Bakteri patogen yang menempel pada sel epitel usus kemudian menginvasi mukosa dan memproduksi toksin sehingga menyebabkan diare (Robbins, 2012). Salah satu cara untuk mempertahankan keseimbangan mikrobiota normal usus dan patogen adalah dengan mengkonsumsi probiotik (Gourbeyre *et al*, 2011).

Probiotik adalah mikroorganisme hidup yang apabila dikonsumsi dalam jumlah yang cukup akan memberi manfaat untuk kesehatan manusia dan bersifat non-patogen (FAO and WHO, 2002). Salah satu minuman probiotik adalah kombucha (Kozyrovska *et al.*, 2012). Kombucha adalah minuman tradisional berbahan dasar teh yang difermentasi oleh *Symbiotic Culture of Bacteria and Yeast* (SCOBY) (Laureys *et al*, 2020). Dalam proses fermentasi, SCOBY mampu mengubah larutan dan gula menjadi minuman berkarbonasi ringan yang memiliki rasa sedikit asam yang menyegarkan dan mengandung asam organik (asam asetat, asam glukonat, asam glukuronat dan asam laktat), vitamin, etanol, protein, polifenol, mineral dan anion (Villarreal-Soto *et al.*, 2018). Syarat mikroba dinyatakan sebagai probiotik adalah memiliki aktivitas antibakteri terhadap mikroba patogen, aktivitas antioksidan, memiliki pH antara 3 hingga 5, tahan terhadap asam, tahan terhadap garam empedu, mampu menempel pada permukaan epitel sel usus, dan memiliki aktivitas *bile salt hydrolase* (Kechagia *et al.*, 2013).

Bahan dasar pembuatan kombucha dapat diganti menggunakan daun sirsak. Daun sirsak yang memiliki kandungan senyawa aktif tannin, saponin, terpenoid, steroid, fenol, flavonoid, flavonol glikosida, alkaloid dan asetogenin telah terbukti memiliki aktivitas antibakteri melalui mekanisme mengganggu sintesa DNA, dan merusak membran sel bakteri (Iyanda-Joel *et al.*, 2019). Namun sediaan daun sirsak dalam kombucha belum diteliti, sehingga perlu dilakukan penelitian untuk membuktikan keefektifan kombucha daun sirsak sebagai antibakteri melalui pengujian zona hambat (*Zone of Inhibition*) metode difusi tipe sumuran pada kultur bakteri *Escherichia coli* dan *Salmonella typhi*.

1.2 Rumusan Masalah

1. Apakah kombucha daun sirsak (*Annona muricata* Linn.) efektif dalam menghambat pertumbuhan bakteri *Escherichia coli*?
2. Apakah kombucha daun sirsak (*Annona muricata* Linn.) efektif dalam menghambat pertumbuhan bakteri *Salmonella typhi*?

1.3 Tujuan

1. Mengetahui efektivitas kombucha daun sirsak (*Annona muricata* Linn.) dalam menghambat pertumbuhan bakteri *Escherichia coli*.
2. Mengetahui efektivitas kombucha daun sirsak (*Annona muricata* Linn.) dalam menghambat pertumbuhan bakteri *Salmonella typhi*.

1.4 Manfaat

1.4.1 Manfaat Teoritis

Penelitian ini diharapkan kombucha daun sirsak dapat menghambat pertumbuhan bakteri *Escherichia coli* dan *Salmonella typhi* sehingga dapat dikembangkan sebagai antibakteri kedepannya.

1.4.2 Manfaat Praktis

Kombucha daun sirsak (*Annona muricata* Linn.) dapat dijadikan sebagai produk yang dapat dipasarkan dimasyarakat.

BAB VII
PENUTUP

7.1 Kesimpulan

1. Kombucha daun sirsak dengan konsentasi 100% efektif dalam menghambat pertumbuhan bakteri *Escherichia coli.*
2. Kombucha daun sirsak dengan konsentasi 50% efektif dalam menghambat pertumbuhan bakteri *Salmonella typhi.*
3. Kombucha daun sirsak lebih mudah menghambat bakteri *Salmonella typhi* dibandingkan bakteri *Escherichia coli.*

7.2 Saran

Adapun beberapa saran untuk meningkatkan penelitian ini di masa mendatang yaitu

1) Melakukan eksplorasi dengan vasiasi lama perebusan.
2) Melakukan eksplorasi dengan menggunakan jumlah serbuk daun sirsak, jumlah gula, dan berat SCOBY yang berbeda.
3) Melakukan fermentasi dengan variasi lama 7, 14, dan 21 hari.
4) Menggunakan kontrol positif dengan antibiotik lain yang cara kerjanya pada dinding sel dan DNA bakteri, untuk mengetahui mekanisme kerja yang mendekati dengan cara kerja kombucha daun sirsak dalam menghambat pertumbuhan bakteri.
5) Melakukan pengujian secara *in vivo* pada hewan coba, untuk membuktikan kombucha daun sirsak dapat dijadikan sebagai probiotik.

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