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EVALUATION OF HEMOSTATIC EFFECTS OF SUNGKAI (*PERONEMA CANESCENS* JACK.) LEAF

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External bleeding refers to the condition where blood exits the body due to the rupture of blood vessels accompanied by tissue damage on the skin surface. Severe external bleeding can lead to blood loss and even death, necessitating prompt hemostasis. Hemostasis can be achieved using hemostatic medications or herbal remedies. One traditionally utilized herbal remedy is Peronema canescens Jack., commonly known as sungkai. However, there has been no prior scientific investigation regarding the use of sungkai for hemostasis.

The aim. *The objective of this study is to evaluate the hemostatic activity of ethanol leaf extract of Peronema canescens Jack.*

Materials and methods. *The hemostatic activity testing was conducted by orally administering formulations to male and female rats for 5 consecutive days. A total of 25 male and 25 female rats were used, divided into 5 groups: normal control (2 mL/kg BW of distilled water), positive control (0.9 mg/kg BW of Phytomenadione), and ethanol leaf extract of Peronema canescens Jack. at doses of 250 mg/kg BW, 500 mg/kg BW, and 1000 mg/kg BW. The day following dosing, bleeding time was measured using the Duke method, involving a 4 cm tail tip amputation to measure the time from the first drop until bleeding cessation. The parameter assessed in this study was the bleeding time, calculated from the first drop until the blood ceased dripping.*

Result. *The mean bleeding times (seconds) in the respective treatment groups of normal control, positive control, ethanol leaf extract of Peronema canescens Jack. at doses of 250 mg/kg BW, 500 mg/kg BW, and 1000 mg/kg BW in male rats were 717.40 ± 29.71; 542.20 ± 22.86; 383.00 ± 11.70; 326.80 ± 22.94; 328.60 ± 11.84, respectively ($p < 0.05$). Similarly, the mean bleeding times (seconds) in the treatment groups in female rats were 451.40 ± 14.31; 396.80 ± 15.40; 381.60 ± 17.15; 328.80 ± 17.73; 264.20 ± 14.65, respectively ($p < 0.05$).*

Conclusion. *The ethanol extract of sungkai leaves shows hemostatic activity, although not as effective as Phytomenadione*

Keywords: *External bleeding, Peronema canescens Jack. leaves, bleeding time, hemostasis*

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1. Introduction

Throughout history, Indonesian society has traditionally utilized plants for medicinal purposes [1–3]. Several studies report that Indonesia is home to approximately 30,000 plant species, with an estimated 7,000 of these possessing medicinal properties [2–4]. For example, the Mamasa tribe in West Sulawesi uses sambung nyawa leaves (*Gynura procumbens*) to treat mild strokes, hibiscus leaves (*Hibiscus rosa-sinensis*) for gout, and *Kalanchoe pinnata* (Lam.) leaves for fever reduction [5]. The Rejang tribe in Bengkulu Province uses turmeric rhizomes or leaves (*Curcuma longa*) for treating ringworm and gastritis, white turmeric rhizomes (*Curcuma zedoria*) for cancer treatment, lime fruit and roots (*Citrus x aurantifolia*) for cough and fever, caladium leaves (*Caladium*) for sprains and bone fractures, and aloe vera (*Aloe vera*) for headaches [6]. In addition to treating these ailments, medicinal plants are also utilized to stop external bleeding, such as betel leaves (*Piper betle* L.), which have been employed by the Sentosa community in Palembang City [7].

External bleeding occurs when the body's surface sustains an injury and blood is expelled due to blood vessel rupture [8]. Naturally, the body possesses a mechanism called hemostasis to repair damaged blood vessels and stop bleeding [9]. The process of hemostasis consists of three stages. The first stage is vasoconstriction, where damaged blood vessels cause endothelial cells to form a platelet plug and smooth muscle contracts to reduce blood loss. The second stage is primary hemostasis, where platelets adhere to the damaged blood vessel, become activated, and form a temporary plug. The third stage is secondary hemostasis, involving the formation of fibrin that reinforces the blood clot and stops further blood loss completely [10, 11]. However, in cases of severe bleeding that the body cannot control, these mechanisms can be expedited with specific treatments [12]. Treatments may include the use of hemostatic medications such as tranexamic acid [13], or the use of herbal remedies [14].

Various medicinal plants have been proven effective in stopping external bleeding, such as betel (*Piper betle* L.) [12], *Myrtus communis* L. [15], *Satureja thymbra* L.,

Thymbra spicata L., and *Verbascum fruticulosum* Post. [16], *Quercus brantii* and *Quercus infectoria* G. Olivier [17], berenuk (*Crescentia cujete* L.) [18], tembelekan (*Lantana camara* L.) [19], bandotan (*Ageratum conyzoides* L.) [20], avocado (*Persea americana* Mill.) [21], and *Kalanchoe pinnata* [22]. These plants are reported to contain phytochemical compounds such as flavonoids, tannins, and saponins, which have the potential to halt external bleeding. Flavonoids function as anticoagulants that inhibit the blood coagulation pathway and play a role in the hemostasis mechanism [16]. Furthermore, tannins act as astringent agents that can control bleeding, trigger platelet aggregation, and prevent blood coagulation [15]. Saponins, on the other hand, can accelerate blood clotting and expedite the cessation of bleeding [22].

Sungkai (*Peronema canescens* Jack.) belongs to the Verbenaceae family [6]. Traditionally, the Dayak and Banjar tribes in East Kotawaringin Regency, Central Kalimantan Province, use young sungkai leaves to boost immunity, treat bruises and fever, and as a postpartum bath ingredient [23]. The Rejang tribe in Bengkulu Province also uses sungkai leaves to treat typhoid fever, hypertension, and gastritis [6]. Additionally, the Baduy community in Java Island uses sungkai leaves to enhance stamina [24], the Bukit Rimbang community in Riau Province uses sungkai leaves for postpartum recovery [25], and the Dayak Meratus tribe in South Kalimantan uses the sap from sungkai stem bark to treat toothaches [26]. Sungkai has also been empirically used as an anthelmintic, mouthwash to prevent dental diseases, external and internal wound treatment, and treatment for bloody diarrhea [27]. In addition to its traditional uses, pharmacological studies on sungkai leaves have demonstrated anti-hyperuricemic activity [27], analgesic properties [28], anti-inflammatory effects [29], antibacterial properties [30], antioxidant effects [31], antipyretic properties [32], and wound healing properties [33].

Phytochemical analysis of 96% ethanol extract from sungkai leaves reveals the presence of flavonoids, alkaloids, saponins, tannins, steroids [34, 35], phenolics [34], and triterpenoids [35]. Another study indicates that methanol extract from sungkai leaves contains flavonoids, phenolics, saponins, steroids [34, 36], alkaloids, tannins [34], and triterpenoids [36]. Testing of the ethyl acetate fraction from sungkai leaves yielded positive results for alkaloids, phenolics [37, 38], flavonoids, tannins [37], triterpenoids, and steroids [38]. Apart from the leaves, research also shows that sungkai stem bark contains phenolic compounds, flavonoids, alkaloids, and saponins [39].

Based on the description of Indonesian society's traditional use of medicinal plants, particularly in stopping external bleeding, and the phytochemical contents found in sungkai leaves, the objective of this study is to evaluate the hemostatic activity of ethanol leaf extract from sungkai.

2. Planning (methodology) of the research

Sungkai (*Peronema canescens* Jack.) is a native Indonesian plant that has been extensively used in traditional medicine. Research indicates that sungkai leaves contain phytochemical compounds such as flavonoids, tannins, and saponins, which are believed to have the potential to stop bleeding. This study aims to evaluate the hemostatic activity of ethanol leaf extract from sungkai. The methodology employed in this research is illustrated in Fig. 1.

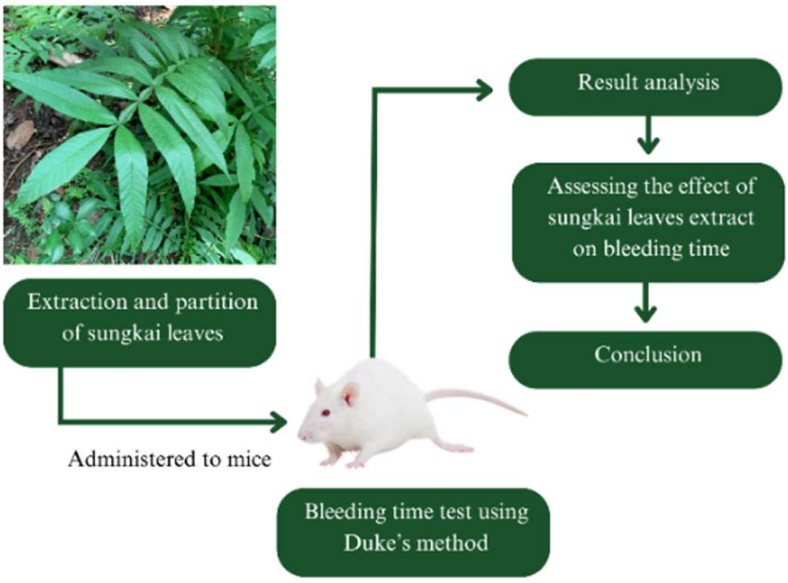

Fig. 1. Research methodology scheme

3. Materials and methods

3. 1. Materials

Standard feed AD II (PT Japfa Comfeed Indonesia), distilled water, 96% ethanol, *ethyl chloride* (Zellaerosol GmbH Germany), and Phytomenadione (Phapros Tbk – Indonesia).

3. 2. Experimental Animals

The test animals used were male and female Wistar strain rats (*Rattus norvegicus*) aged 9-11 weeks with body weights ranging from 200–250 g. Each group consisted of 25 male and 25 female rats. The animals were obtained from the animal facility of Gajah Mada University (UGM), Yogyakarta, Indonesia. Prior to testing, the animals were acclimatized for seven days and provided ad libitum access to food and water. The rats were adapted and housed in a laboratory environment with well-ventilated, clean cages and were kept separately [40]. All procedures involving the handling of the test animals in this study were approved by the Research Ethics Committee of the Faculty of Medicine, Tanjungpura University, Indonesia, with approval number 6289/UN22.9/PG/2023.

3. 3. Plant material

The plant sample used was sungkai leaves (*Peronema canescens* Jack.), collected from the Landak Regency, West Kalimantan, Indonesia and identified (No. 152/A/LB/FMIPA/UNTAN/2024) by the Faculty of Mathematic and Science Biology Laboratory, Tanjung-

pura University, Indonesia. The sungkai leaves were initially rinsed with running water to remove any adhering debris and then dried. Damaged leaves were separated during the drying process. Subsequently, the dried leaves were cut into smaller pieces and air-dried in the shade to prevent direct exposure to sunlight [41].

3. 4. Extraction and partition

After being thoroughly dried, the sample was extracted by maceration for 3 × 24 hours using 96% ethanol. After 24 hours, the macerated mixture was filtered using filter paper to obtain the filtrate. The sample was then macerated again with 96% ethanol. This step was repeated three times. The filtrates obtained from the maceration process were combined and concentrated using a rotary vacuum evaporator to obtain a concentrated extract. The total weight of the filtrate produced was then calculated [42].

3. 5. Phytocemical screening

Phytochemical screening is a qualitative test used to analyze secondary metabolites present in ethanol leaf extract of sungkai (*Peronema canescens* Jack.). The compounds analyzed include alkaloids, flavonoids, saponins, terpenoids, steroids, and tannins.

3. 6. External bleeding stop activity test

Each male and female rat was divided into five groups, each consisting of five rats. The first group served as the normal control and received distilled water at a dose of 2 mL/kg BW. The second group served as the positive control and received Phytomenadione (vitamin K1) at a dose of 0.9 mg/kg BW. The third group received ethanol leaf extract of sungkai at a dose of 250 mg/kg BW. The fourth group received ethanol leaf extract of sungkai at a dose of 500 mg/kg BW. The fifth group received ethanol leaf extract of sungkai at a dose of 1000 mg/kg BW [43].

After acclimatization, the rats were administered the preparations for five consecutive days, and on the sixth day, bleeding time was measured. The preparations were given orally once daily [44]. This study employed the Duke method, as it closely simulates external bleeding common clinically [20]. Despite its simplicity, this method provides a clear representation of the hemostatic efficacy of an agent administered either orally or topically. Before starting the bleeding time measurement, the rat tails were immersed in warm water at 40°C and dried [45]. After cleaning, the tails were topically anesthetized using ethyl chloride around the area to be incised, then a 4 cm segment was cut from the base of the tail [46]. Blood droplets were allowed to fall onto filter paper without touching the wound. The bleeding time was recorded from the first drop touching the filter paper until the bleeding stopped [45]. The measurement of bleeding time was limited to 20 minutes for data analysis purposes. The bleeding time for each rat was then averaged [44]. The presence of hemostatic activity is indicated by a shorter bleeding time after treatment [18, 46].

4. Result

4. 1. Plant material

The wet weight of the leaf sample obtained is 1.57 kg. After drying, the weight of the leaf sample is 550 grams.

4. 2. Extraction and partition

The total extract obtained from the extraction process is 32.4 grams, with a yield of 5.89%.

4. 3. Phytocemical screening

Based on the phytochemical screening results conducted, the ethanol extract of sungkai leaves (*Peronema canescens* Jack.) tested positive for alkaloids, flavonoids, saponins, steroids, and tannins (Table 1).

Table 1

Phytochemical screening results of ethanol extract of sungkai leaves (*Peronema canescens* Jack.)

Test parameters	Concentration
Alkaloids (Mayer)	–
Alkaloids (Wagner)	+
Alkaloid (Dragendorff)	–
Flavonoid (Mg + HCl)	+
Saponin	+++
Terpenoid	–
Steroid	+++
Tannin	+++

Note: "–" – absent, "+" – low concentration, "++" – moderate concentration, "+++" – high concentration.

4. 4. External bleeding stop activity test

Based on the measurement of bleeding time in male rats, it was found that the group given a dose of 500 mg/kg BW had a shorter bleeding time compared to the other groups. Significant differences were observed among the treatment groups except between the groups given a dose of 500 mg/kg BW and 1000 mg/kg BW ($p > 0.05$) (Table 2).

Table 2

The results of bleeding time measurement in male rats

Treatment	Bleeding time (seconds)
Normal Control (Distilled water 2 mL/kg BW)	$717.40^{d} \pm 29.71$
Positive Control (Phytomenadione 0.9 mg/kg BW)	$542.20^{c} \pm 22.86$
Application of Ethanol Extract from Sungkai Leaves at a dose of 250 mg/kg BW	$383.00^{b} \pm 11.70$
Application of Ethanol Extract from Sungkai Leaves at a dose of 500 mg/kg BW	$326.80^{a} \pm 22.94$
Application of Ethanol Extract from Sungkai Leaves at a dose of 1000 mg/kg BW	$328.60^{a} \pm 11.84$

Note: N = 5; Values are presented as mean ± standard deviation; Superscript letters indicate no significant difference ($p > 0.05$). The data were analyzed using One-Way ANOVA followed by Tukey's test.

Based on the measurement of bleeding time in female rats, it was found that the group given a dose of

1000 mg/kg BW had a shorter bleeding time compared to the other groups. Significant differences were observed among treatment groups, except between the positive control group and the group given a dose of 250 mg/kg BW ($p > 0.05$) (Table 3).

Table 3

The results of bleeding time measurement in female rats

Treatment	Bleeding time (seconds)
Normal Control (Distilled water 2 mL/kg BW)	$451.40^{d} \pm 14.31$
Positive Control (Phytomenadione 0.9 mg/kg BW)	$396.80^{c} \pm 15.40$
Application of Ethanol Extract from Sungkai Leaves at a dose of 250 mg/kg BW	$381.60^{c} \pm 17.15$
Application of Ethanol Extract from Sungkai Leaves at a dose of 500 mg/kg BW	$328.80^{b} \pm 17.73$
Application of Ethanol Extract from Sungkai Leaves at a dose of 1000 mg/kg BW	$264.20^{a} \pm 14.65$

Note: N = 5; Values are presented as mean ± standard deviation; Superscript letters indicate no significant difference ($p > 0.05$). The data were analyzed using One-Way ANOVA followed by Tukey's test.

5. Discussion

Hemorrhage is a condition characterized by the loss of blood due to injured or damaged blood vessels [20, 47]. There are two types of hemorrhage: internal (closed) hemorrhage and external (open) hemorrhage. Internal hemorrhage occurs within closed wounds, making it difficult to identify, whereas external hemorrhage originates from open wounds and can be easily identified through physical examination. External hemorrhage involves damage to blood vessels along with tissue damage to the skin, leading to blood loss from the body [47, 48]. External hemorrhage can result in blood loss and potentially death, necessitating immediate cessation of bleeding [20, 49].

Hemostasis is a complex process. Coagulation begins when blood platelets (thrombocytes) and other factors in the blood plasma adhere to the damaged blood vessel. The platelets then surround the injured area and clot to cover the wound [18], [50]. This process is related to the body's hemostasis mechanism, which stops bleeding in damaged blood vessels [20, 51]. Bleeding time is the interval from the first drop of blood to the cessation of bleeding. The duration of bleeding time can serve as a measure of whether hemostatic activity is present or not [20, 52]. The presence of hemostatic activity is indicated by a shorter bleeding time [18, 46].

The research results show in the normal control group treated with water, male rats had longer bleeding time compared to female rats. This suggests that the intrinsic hemostatic system in male rats functions more slowly. In the positive control group treated with Phytomenadione, bleeding time decreased in both sexes, with a more pronounced reduction observed in male rats. In the group treated with doses of 250 mg/kg BW, a substantial decrease in bleeding time occurred, with comparable effects observed in both males and females. This indicates that the dose began to exert a pharmacological effect, although it had not yet reached optimal efficacy. In the group treated with doses of 500 mg/kg BW, bleeding time in male rats decreased to its lowest point, identifying this as the optimal effective dose for males. In female rats, the same dose also caused a significant reduction in bleeding time, though not yet reaching maximum efficacy. Conversely, the group treated with 1000 mg/kg BW in male rats did not result in a further reduction in bleeding time compared to the 500 mg/kg dose, even though there was a slight increase. However, in female rats, this dose produced the most pronounced effect in reducing bleeding time and thus can be considered the optimal effective dose for females.

In male rats, the group treated with a dose of 500 mg/kg BW had a shorter bleeding time compared to the group treated with doses of 250 mg/kg BW ($p > 0.05$) and 1000 mg/kg BW ($p > 0.05$). Meanwhile, the normal control group treated with water had the longest bleeding time compared to the other groups ($p > 0.05$). Conversely, the positive control group treated with Phytomenadione had a shorter bleeding time than the normal control group but longer compared to the groups treated with doses of 250 mg/kg BW, 500 mg/kg BW, and 1000 mg/kg BW ($p > 0.05$) (Table 2). In female rats, the group treated with a dose of 1000 mg/kg BW had a shorter bleeding time compared to the groups treated with doses of 500 mg/kg BW and 250 mg/kg BW ($p > 0.05$). The normal control group treated with water had the longest bleeding time compared to the other groups ($p > 0.05$). Conversely, the positive control group treated with Phytomenadione had a shorter bleeding time than the normal control group but longer compared to the groups treated with doses of 250 mg/kg BW ($p > 0.05$), 500 mg/kg BW, and 1000 mg/kg BW ($p > 0.05$) (Table 3). The difference in effective doses between male and female rats may be attributed to a phenomenon known as the *ceiling effect*, in which an increase in drug dosage or concentration yields progressively smaller pharmacological effects [53]. There are also differences in drug metabolism between male and female rats. Drug metabolism in male rats is faster compared to female rats [54]. This enhanced metabolic capacity contributes to greater sensitivity in male rats to lower doses of pharmacological agents [55].

Distilled water as the normal control is neutral, thus it does not affect the physiological processes in rats and does not show any hemostatic activity [12, 56]. Meanwhile, the administration of Phytomenadione as the positive control influences thrombin formation, strengthens coagulation, accelerates blood clotting time, and enhances blood clotting factor activity [43].

Based on the results of qualitative phytochemical analysis, the ethanol extract of sungkai leaves contains alkaloids, flavonoids, saponins, steroids, and tannins (Table 1). Furthermore, previous research indicates that flavonoids, tannins, and saponins have hemostatic activity. Flavonoids exert vasoconstriction mechanisms in hemostasis that stimulate platelet aggregation, enabling the formation of platelet plugs. These plugs effectively stop bleeding by sealing the wound [20]. In addition to vasoconstriction, flavonoids also

act as anticoagulants [15]. Tannins are reported to control bleeding through their astringent effects [15, 22]. This astringent effect induces the synthesis of thromboxane A2, a vasoconstrictor that activates platelets and accelerates aggregation, thereby forming platelet plugs [20]. Moreover, tannins can reduce capillary permeability, intercellular space contraction, and capillary endothelium hardening and form protective layers, tightening and shrinking the superficial cell layer [56]. Saponins, on the other hand, function in platelet activation, which is crucial in blood clot formation and aids in the process of hemostasis [57].

In addition to the aforementioned mechanisms, flavonoids, tannins, and saponins exhibit anti-inflammatory activity that contributes to the hemostatic process [58, 59]. Flavonoids exert their anti-inflammatory effects by reducing capillary permeability. When blood vessels are damaged, capillary permeability increases, allowing blood to leak into surrounding tissues [60]. Tannins demonstrate anti-inflammatory properties by inhibiting the release of inflammatory mediators [61], and enhancing the immune response through the activation of neutrophils and macrophages, including the stimulation of phagocytosis [62]. Similarly, saponins reduce capillary permeability, akin to flavonoids. Moreover, saponins possess natural cleansing properties that promote wound healing [58].

Several studies have stated that flavonoids, tannins, and saponins play a role in stopping bleeding, although they are often described only in general terms. Each of these compound groups can act independently to stop bleeding. However, their effects become more effective and synergistic when combined, particularly flavonoids and tannins [56, 63].

The length of bleeding time is influenced by factors related to the circulatory system. Wistar male and female rats have a normotensive blood pressure profile as they show statistically insignificant differences. The average heart rate of male rats is 361.46 beats per minute, and female rats is 349.38 beats per minute. Additionally, the blood flow of male rats is 17.20 mL/minute, and female rats are 23.15 mL/minute. Blood pressure is influenced by factors such as age, sex, race, and genetics (heritability) [64]. Hematologically, at 2 months of age, male rats have a hemoglobin level of 13.72 g/dL, hematocrit of 45.60%, erythrocyte count of $8.29 \times 10^6/mm^3$, and leukocyte count of $4.01 \times 10^3/mm^3$. Female rats have a hemoglobin level of 13.55 g/dL, hematocrit of 45.20%, erythrocyte count of $7.46 \times 10^6/mm^3$, and leukocyte count of $5.75 \times 10^3/mm^3$ [65].

Based on the overall results of the study, ethanol extract of sungkai leaves is effective in shortening bleeding time in both male and female rats, although not as effective as Phytomenadione at a dose of 0.9 mg/kg BW. The effective doses for stopping bleeding in male rats are sequentially 500 mg/kg BW, 1000 mg/kg BW, and 250 mg/kg BW. Meanwhile, in female rats, the effective doses for stopping bleeding sequentially are 1000 mg/kg BW, 500 mg/kg BW, and 250 mg/kg BW.

Although this study focused on external bleeding, the use of oral administering indicates the potential applicability of the ethanol extract of sungkai leaves in treating internal or mild bleeding, which should be explored in future studies.

Practical relevance. The evaluation of the hemostatic effect of the ethanol extract of sungkai leaves conducted in this study has the potential to be developed into topical formulations such as ointments, gels, or sprays as natural alternatives for external wound management. Furthermore, the use of this extract in pharmaceutical preparations could broaden treatment options in clinical practice, particularly in regions with limited access to synthetic drugs.

Research limitations. This study has certain limitations that should be considered. The sungkai leaf samples used were obtained from a single location, which may restrict the generalizability of the findings to sungkai populations from different regions with varying environmental and genetic conditions. Therefore, further research involving samples from multiple locations is necessary to strengthen these findings. Additionally, external factors such as temperature, humidity, and soil conditions, which may influence the plant's activity, were not fully controlled in this study.

Prospects for further research. Expanding sample collection from various geographical locations to enhance the generalizability of findings and provide deeper insights into the plant's variability; exploring the potential of sungkai extract for pharmaceutical formulations, such as gels, sprays, or ointments, could facilitate its practical use as a natural hemostatic agent; assess the stability and shelf life of sungkai extract to determine optimal storage conditions and preservation methods for maintaining its efficacy over time; and investigating synergistic effects between sungkai extract and other medicinal plants known for hemostatic properties may lead to enhanced therapeutic formulations.

6. Conclusion

The ethanol extract of sungkai leaves has undergone phytochemical screenings, revealing the presence of alkaloids, flavonoids, saponins, steroids, and tannins. The presence of flavonoids, tannins, and saponins contributes to the hemostatic activity of the ethanol extract of sungkai leaves. Flavonoids exert vasoconstriction mechanisms in hemostasis and also act as anticoagulants, tannins are reported to control bleeding through their astringent effects, and saponins function in platelet activation.

This study utilized male and female Wistar strain rats (*Rattus norvegicus*), with each group consisting of 25 individuals. Based on the measurement of bleeding time in male rats, it was found that the group administrated ethanol extract of sungkai leaves at a dose of 500 mg/kg BW exhibited a shorter bleeding time compared to other groups. Similarly, in female rats, the group receiving ethanol extract of sungkai leaves at a dose 1000 mg/kg BW demonstrated a shorter bleeding time than the others. This finding indicates that the ethanol extract of sungkai leaves shows hemostatic activity, although not as effective as Phytomenadione.

Conflict of interest

The author declares that they have no conflict of interest in relation to this research, whether financial,

personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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Data availability
Data will be made available on reasonable request.

Use of artificial intelligence
The authors confirm that they did not use artificial intelligence technologies when creating current work.

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References

1. Andesmora, E. V., Aprianto, R., Tomi, D., Syahmi, W. (2022). Keanekaragaman tanaman obat di masyarakat lokal Semerap, Kabupaten Kerinci, Jambi. Jurnal Hutan dan Masyarakat, 14 (2), 99–112.

2. Lestari, E., Lagiono, L. (2018). Pemanfaatan Tanaman Sebagai Obat Oleh Masyarakat Desa Karang Dukuh Kecamatan Belawang Kabupaten Barito Kuala. Jurnal Pendidikan Hayati, 4 (3), 114–119. https://doi.org/10.33654/jph.v4i3.309

3. Wakhidah, A. Z., Ika, P., Isma, N. A. (2017). Studi pemanfaatan tumbuhan sebagai bahan obat oleh masyarakat desa Marimabate di Kecamatan Jailolo, Halmahera Barat. Jurnal Pro-Life, 4 (1), 275–286.

4. Jumiarni, W. O., Komalasari, O. (2017). Eksplorasi jenis dan pemanfaatan tumbuhan obat pada masyarakat suku Muna di permukiman Kota Muna. Traditional Medicine Journal, 22 (1), 45–46.

5. Alang, H., Rosalia, S., Ainulia, A. D. R. (2022). Inventarisasi Tumbuhan Obat Sebagai Upaya Swamedikasi Oleh Masyarakat Suku Mamasa Di Sulawesi Barat. Quagga: Jurnal Pendidikan Dan Biologi, 14 (1), 77–87. https://doi.org/10.25134/quagga.v14i1.4852

6. Sitorban, T. N., Nursaadah, E., Primairyani, A. (2023). Keanekaragaman Hayati Tumbuhan Obat Tradisional dan Pemanfaatanya. BIOEDUSAINS:Jurnal Pendidikan Biologi Dan Sains, 6 (2), 531–544. https://doi.org/10.31539/bioedusains.v6i2.7547

7. Larasati, A., Maini, M., Kartika, T. (2019). Inventarisasi tumbuhan berkhasiat obat di sekitar pekarangan di kelurahan sentosA. Indobiosains, 1 (2), 76–87. https://doi.org/10.31851/indobiosains.v1i2.3198

8. Bulger, E. M., Snyder, D., Schoelles, K., Gotschall, C., Dawson, D., Lang, E. et al. (2014). An Evidence-based Prehospital Guideline for External Hemorrhage Control: American College of Surgeons Committee on Trauma. Prehospital Emergency Care, 18 (2), 163–173. https://doi.org/10.3109/10903127.2014.896962

9. Du, J., Wang, J., Xu, T., Yao, H., Yu, L., Huang, D. (2023). Hemostasis Strategies and Recent Advances in Nanomaterials for Hemostasis. Molecules, 28 (13), 5264. https://doi.org/10.3390/molecules28135264

10. Malik, A., Rehman, F. U., Shah, K. U., Naz, S. S., Qaisar, S. (2021). Hemostatic strategies for uncontrolled bleeding: A comprehensive update. Journal of Biomedical Materials Research Part B: Applied Biomaterials, 109 (10), 1465–1477. Portico. https://doi.org/10.1002/jbm.b.34806

11. Aird, W. C. (2015). Endothelium and haemostasis. Hämostaseologie, 35 (1), 11–16. https://doi.org/10.5482/hamo-14-11-0075

12. Sutopo, T., Bestari, R. S., Sintowati, R. (2017). Uji ekstrak etanol 70% daun sirih (*Piper betl*e L.) terhadap bleeding time pada mencit jantan galur swiss webster. Biomedika, 8 (2). https://doi.org/10.23917/biomedika.v8i2.2917

13. Purwoko, Thamrin, H., Rachmad, Y. (2022). Perbandingan Efek Asam Traneksamat, Etamsylate dan Kombinasi dengan Profil Waktu Perdarahan pada Operasi Sedang. Jurnal Anestesi Perioperatif, 10 (1), 10–16. https://doi.org/10.15851/jap.v10n1.2461

14. Mudiyanselage, A., Chamara, R., Thiripuranathar, G., Chamara, A. M. R., Thiripuranathar, G. (2020). Assessment of haemostatic activity of medicinal plants using in vitro methods: A concise review. Journal of Pharmacy and Biological Sciences, 15 (1), 26–34. https://doi.org/10.9790/3008-1501022634

15. Ebrahimi, F., Mahmoudi, J., Torbati, M., Karimi, P., Valizadeh, H. (2020). Hemostatic activity of aqueous extract of *Myrtus communis* L. leaf in topical formulation: In vivo and in vitro evaluations. Journal of Ethnopharmacology, 249, 112398. https://doi.org/10.1016/j.jep.2019.112398

16. Omar, G., Abdallah, L., Barakat, A., Othman, R., Bourinee, H. (2020). In vitro haemostatic efficacy of aqueous, methanol and ethanol plant extracts of three medicinal plant species in Palestine. Brazilian Journal of Biology, 80 (4), 763–768. https://doi.org/10.1590/1519-6984.219186

17. Ahmadianfar, S., Mehrabi, N., Mohammadi, S., Sobhanizadeh, A., Moradabadi, A., Noroozi-Aghideh, A. (2023). Effects of Horsetail, Alfalfa, Ortie, Chêne and Aleppo oak as Potential Hemostatic Agents on Laboratory Coagulation Tests. Natural Product Sciences, 29 (1), 42–49. https://doi.org/10.20307/nps.2023.29.1.42

18. Kusuma, A. M., Sulistyo, A. N., Susanti, S., Sabikis, S. (2014). Aktivitas Penghentian Pendarahan Luar Ekstrak Etanol Daun Berenuk (*Crescentia cujete* L) Secara In-Vivo. Pharmaceutical Sciences and Research, 1 (2), 134–140. https://doi.org/10.7454/psr.v1i2.3299

19. Pauran, M. P., Karauwan, F. A., Kanter, J. (2019). Efek Hemostatis Ekstrak Daun Tembelekan *Lantana camara* L. Terhadap Luka Potong Pada Tikus Putih Rattus norvegicus. Biofarmasetikal Tropis, 2 (2), 34–39. https://doi.org/10.55724/jbiofartrop.v2i2.92

20. Sidrotullah, M. S. (2021). Efek waktu henti pendarahan (bleeding time) daun bandotan (*Ageratum conyzoides* L.) pada mencit (Mus musculus). Journal Syifa Sciences and Clinical Research, 3 (1), 37–44. https://doi.org/10.37311/jsscr.v3i1.9909

21. Winiswara, M. W., Yuwono, B., Adriatmoko, W. (2021). Pengaruh ekstrak biji alpukat (*Persea americana* Mill.) terhadap waktu perdarahan pada luka potong ekor mencit (strain Balb-c). Padjadjaran Journal of Dental Researchers and Students, 5 (2), 140. https://doi.org/10.24198/pjdrs.v5i2.34613

22. Cholid, Z., Prasetya, R. C., Sukamto, B. R. P. (2022). Efektivitas ekstrak daun cocor bebek (*Kalanchoe pinnata*) terhadap waktu perdarahan (bleeding time) pada ekor mencit strain Balb-C. Padjadjaran Journal of Dental Researchers and Students, 6 (2), 144. https://doi.org/10.24198/pjdrs.v6i2.39618

23. Sari, S. G., Rahmawati, R., Rusmiati, R., Susi, S. (2023). Etnomedisin Tumbuhan Sungkai (*Peronema Canescens*) Oleh Suku Dayak Dan Suku Banjar Di Kalimantan Tengah. EnviroScienteae, 19 (1), 35. https://doi.org/10.20527/es.v19i1.15736

24. Qamariah, N., Mulia, D. S., Fakhrizal, D. (2020). Indigenous Knowledge of Medicinal Plants by Dayak Community in Mandomai Village, Central Kalimantan, Indonesia. Pharmacognosy Journal, 12 (2), 386–390. https://doi.org/10.5530/pj.2020.12.60

25. Rosalia, N., Susandarini, R. (2020). Medicinal plants diversity in Bukit Rimbang Bukit Baling Wildlife Reserve, Riau, Indonesia. International Journal of Herbal Medicine, 8 (4), 33–38. Available at: https://www.florajournal.com/archives/2020/vol8issue4/PartA/7-5-63-374.pdf

26. Elsi, Y., Satriadi, T., Istikowati, W. T. (2020). Etnobotani obat-obatan yang dimanfaatkan masyrakat adat Dayak Meratus Desa Ulang Kabupaten Hulu Sungai Selatan Kalimantan Selatan. Jurnal Sylva Scienteae, 3 (1), 193–201.

27. Latief, M., Tri, A. F., Sari, P. M., Tarigan, I. L. (2021). Aktivitas antiinflamasi ekstrak etanol daun sungkai (*Peronema canescens* Jack) pada mencit terinduksi karagenan. Jurnal Farmasi Sains dan Praktis, 7 (2), 144–153.

28. Sinaga, M. P. Br., Mambang, D. E. P., Lubis, M. S., Yuniarti, R. (2022). Uji aktivitas analgesik ekstrak daun sungkai (*Peronema canescens* Jack.) terhadap mencit jantan (*Mus musculus*). Farmasainkes: Jurnal Farmasi Sains, dan Kesehatan, 2 (1), 100–110. https://doi.org/10.32696/fjfsk.v2i1.1378

29. Aztur, F. T., Simamora, S., Nurzana, N. I. K., Supriyanti, Y. (2023). Aktivitas antiinflamasi ekstrak etanol daun sungkai *(Peronema canescens* Jack) dalam formulasi sirup terhadap kadar c-reaktif protein pada tikus putih jantan (*Rattus norvegicus*) yang diinduksi karagenan. Jurnal Pharmacopoeia, 2 (1), 65–76. https://doi.org/10.33088/jp.v2i1.364

30. Pradito, S. A., Muthmainah, N., Biworo, A. (2022). Perbandingan Aktivitas Antibakteri Sediaan Infus dan Sediaan Ekstrak Daun Sungkai (*Peronema canescens* Jack) terhadap Bakteri Staphylococcus aureus. Homeostasis, 5 (1), 135. https://doi.org/10.20527/ht.v5i1.5212

31. Okfrianti, Y., Irnameria, D., Bertalina, B. (2022). Aktivitas Antioksidan Ekstrak Etanol Daun Sungkai (*Peronema canescens* Jack). Jurnal Kesehatan, 13 (2), 333–339. https://doi.org/10.26630/jk.v13i2.3200

32. Hardiansyah, S. G., Oktriani, P. (2021). Uji aktivitas antipiretik ekstrak daun sungkai (*Peronema canescens*) terhadap tikus putih jantan yang diinduksi dengan vaksin DPT-Hb. Jurnal Ilmiah Multi Science, 11 (2), 130–135. https://doi.org/10.52395/jkjims.v11i2.334

33. Sari, N., Latief, M., Elisma. (2022). Uji aktivitas ekstrak etanol daun sungkai (*Peronema canescens* Jack) terhadap penyembuhan luka bakar pada kelinci jantan (*Oryctolagus cuniculus*). Indonesian Journal of Pharma Science, 4 (1), 113–122.

34. Chandra, M. A., Hidayatullah, M., Sari, P. E. (2019). Perbandingan rendemen, skrining fitokimia dan profil kromatografi lapis tipis ekstrak etanol 96% dan metanol daun sungkai (*Peronema canescens* Jack). Jurnal Kesehatan Islam, 8 (1), 20–24.

35. Rahma, C. S. A., Ardini, D., Isnenia, Mulatasih, E. R. (2022). Profil metabolit sekunder daun sungkai (Peronema canescens J) dan aktivitas antioksidan ekstrak etanol daun sungkai (*Peronema canescens* J) dengan metode DPPH. Jurnal Analis Farmasi, 7 (2), 192–210.

36. Adlis Santoni, Mai Efdi, Fadhillah, N. (2023). Profil Fitokimia dan Penentuan Fenolik Total, Flavonoid Total, dan Uji Aktivitas Antioksidan Ekstrak Daun Sungkai (*Peronema canescens* Jack) dari Daerah Kota Padang. Jurnal Kimia Unand, 12 (1), 1–6. https://doi.org/10.25077/jku.12.1.1-6.2023

37. Ramadenti, F., Sundaryono, A., Handayani, D. (2017). Uji fraksi etil asetat daun Peronema canescens terhadap Plasmodium berghei pada Mus musculus. Jurnal Pendidikan dan Ilmu Kimia, 1 (2), 89–92.

38. Pindan, N. P., Daniel., Saleh, C., Magdaleni, A. R. (2021). Uji fitokimia dan uji aktivitas antioksidan ekstrak fraksi n-heksana, etil asetat dan etanol sisa dari daun sungkai (*Peronema canescens* Jack.) dengan metode DPPH. Jurnal Atomik, 6 (1), 22–27.

39. Ramadhani, N., Samudra, A. G., Pertiwi, R., Utami, C. D., Muslimah, A., Syahidah, W., & Khodijah, P. S. (2022). Analisis Total Fenol Dan Flavonoid Ekstrak Etanol Kulit Batang Sungkai (*Peronema canescens* Jack). PHARMACY: Jurnal Farmasi Indonesia (Pharmaceutical Journal of Indonesia), 19 (1), 66–79. https://doi.org/10.30595/pharmacy.v19i1.12554

40. Panjaitan, R. G. P., Afandi, A., Aprilia, S. D. (2023). Diuretic Potency of Belalai Gajah Plants (*Clinacanthus nutans* (*Burm. fil*.) Lindau). Pharmacognosy Journal, 15 (2), 365–369. https://doi.org/10.5530/pj.2023.15.56

41. Panjaitan, R. G. P., Astuti, A. (2021). Antidiabetic Activity of the Leaf Extract of Eurycoma Longifolia Jack. in Streptozotocin-Nicotinamide Induced Diabetic Model. Pharmacognosy Journal, 13 (6s), 1582–1588. https://doi.org/10.5530/pj.2021.13.203

42. Panjaitan, R. G. P., Mery, M. W. (2023). Hepatoprotective activity of Mitragyna speciosa Korth. on liver damage caused by Tuak. Indian Journal Traditional Knowlegde, 22 (1), 133–139. https://doi.org/10.56042/ijtk.v22i1.46266

43. Fidele, K. Z., Michèle, B. G., Auguste, A. J. (2022). Evaluation of hemostatic and antihemolytic effects of aqueous extract of *Garcinia kola* (Clusiaceae) fresh seeds. Journal of Biosciences and Medicines, 10 (4), 205–218. https://doi.org/10.4236/jbm.2022.104018

44. Wang, Y., Hao, J., Gao, W., Liu, Z., Wu, S., Jing, S. (2013). Study on hemostatic activities of the rhizome of Paris bashanensis. Pharmaceutical Biology, 51 (10), 1321–1325. https://doi.org/10.3109/13880209.2013.790065

45. Hugar, L., Ramesh. (2014). Evaluation of haemostatic effect of Cynodon dactylon pers in albino rats. Journal of Evolution of Medical and Dental Sciences, 3 (11), 2711–2713. https://doi.org/10.14260/jemds/2014/2197

46. Totuk, Ö. M. G., Güzel, Ş. E., Ekici, H., Kumandaş, A., Aydıngöz, S. E., Yılmaz, E. Ç. et al. (2020). Effects of algan hemostatic agent on bleeding time in a rat tail hemorrhage model. Ulusal Travma ve Acil Cerrahi Dergisi, 26 (6), 853–858. https://doi.org/10.14744/tjtes.2020.50384

47. Johnson, A., Burns, B. (2024). Hemorrhage. Treasure Island. Available at: https://www.ncbi.nlm.nih.gov/books/NBK542273/

48. Tandi, A. N., Sudharmono, U. (2022). Pengetahuan pertolongan pertama pada perdarahan luar volunteer fire brigade di dataran tinggi PT Freeport Indonesia. Jurnal Kesehatan, 10 (1), 35–40. https://doi.org/10.55912/jks.v10i1.46

49. Nurani, R. D., Yanti, F. (2023). Pelatihan pertolongan pertama menangani masalah perdarahan dan evakuasi korban pada remaja di SMAN 8 Bandar Lampung. Jurnal Pengabdian Masyarakat, 2 (1), 20–24. https://doi.org/10.59030/jpmbd.v2i1.20

50. Smith, S. A., Travers, R. J., Morrissey, J. H. (2015). How it all starts: Initiation of the clotting cascade. Critical Reviews in Biochemistry and Molecular Biology, 50 (4), 326–336. https://doi.org/10.3109/10409238.2015.1050550

51. Periayah, M. H., Halim, A. S., Saad, A. Z. M. (2017). Mechanism action of platelets and crucial blood coagulation pathways in Hemostasis. International Journal of Hematology-Oncology and Stem Cell Research, 11 (4), 319–327.

52. Betigri, A. V., Anjali, Sakshi, P., Joshi, K. (2024). Study of blood group and its relation with bleeding and clotting time. Pakistan Heart Journal, 57 (1), 287–290.

53. Richardson, M. G., Raymond, B. L. (2018). Lack of Evidence for Ceiling Effect for Buprenorphine Analgesia in Humans. Anesthesia & Analgesia, 127 (1), 310–311. https://doi.org/10.1213/ane.0000000000003368

54. Bisala, F. K., Ya'la, U. F., Dermiati, T. (2019). Uji efek antidiabetes ekstrak etanol daun talas pada tikus putih jantan hiperkolesterolemia-diabetes. Farmakologika Jurnal Farmasi, 16 (1), 13–24.

55. Amriani S, A., Fitrya, F., Novita, R. P., & Caniago, D. (2021). Uji Aktivitas Antidiabetes Ekstrak Etanol Akar Kabau (*Archidendron bubalinum* (Jack) I.C. Nielsen) terhadap Tikus Putih Jantan yang Diinduksi Diet Tinggi Lemak dan Fruktosa. Jurnal Penelitian Sains, 23 (2), 102. https://doi.org/10.56064/jps.v23i2.635

56. Kusumastuti, D. M., Cholid, Z., Adriatmoko, W. (2021). Pengaruh Ekstrak Kulit Buah Naga Merah (*Hylocereus* Polyrhizus) terhadap Waktu Perdarahan (Bleeding Time) Pada Mencit Strain Balb-C. STOMATOGNATIC – Jurnal Kedokteran Gigi, 18 (2), 61–64. https://doi.org/10.19184/stoma.v18i2.28058

57. Olas, B., Urbańska, K., Bryś, M. (2020). Saponins as Modulators of the Blood Coagulation System and Perspectives Regarding Their Use in the Prevention of Venous Thromboembolic Incidents. Molecules, 25 (21), 5171. https://doi.org/10.3390/molecules25215171

58. Falsianingrum, M., Retnaningsih, a., Feladita, N. (2023). Uji efektivitas antiinflamasi dalam sediaan salep lidah buaya (*Aloe vera* L) terhadap kelinci jantan (Oryctolagus cuniculus). Jurnal Analisi Farmasi, 8 (1), 90–102. https://doi.org/10.33024/jaf.v8i1.9915

59. Garakia, C. S. H., Sangi, M., Koleangan, H. S. J. (2020). Uji Aktivitas Antiinflamasi Ekstrak Etanol Tanaman Patah Tulang (*Euphorbia tirucalli* L.). Jurnal MIPA, 9 (2), 60. https://doi.org/10.35799/jmuo.9.2.2020.28709

60. Fitriyani, A., Winarti, L., Muslichah, S. (2011). Uji antiinflamasi ekstrak metanol daun sirih merah (*Piper crocatum* Ruiz & Pav). Majalah Obat Tradisional, 16 (1), 34–42.

61. Anisa, N., Amaliah, N, A., Al Haq, P, M., Arifin, A, N. (2019). The effectiveness of anti inflation mangoes leaves (*Mangifera Indica*) against burns degrees two. Sainsmat: Jurnal Ilmiah Ilmu Pengetahuan Alam, 8 (1), 1–7. https://doi.org/10.35580/sainsmat81101182019

62. Meilina, A., Nindita, Y., Sunarsih, E. S. (2022). Uji Aktivitas Ekstrak Etanol 70% Kulit Pisang Ambon Kuning (*Musa acuminata* Colla) terhadap Penyembuhan Luka Sayat pada Kelinci (Oryctolagus cuniculus). Generics: Journal of Research in Pharmacy, 2 (2), 119–126. https://doi.org/10.14710/genres.v2i2.15612

63. Pertiwi, R., Manaf, S., Supriati, R., Saputra, H. M., Ramadhanti, F. (2020). Pengaruh Pemberian Salep Kombinasi Ekstrak Daun Morinda citrifolia dan Batang Euphorbia tirucalli terhadap Penyembuhan Luka. Jurnal Farmasi Dan Ilmu Kefarmasian Indonesia, 7 (1), 42–50. https://doi.org/10.20473/jfiki.v7i12020.42-50

64. Nugroho, S. W., Fauziyah, K. R., Sajuthi, D., Darusman, H. S. (2018). Profil Tekanan Darah Normal Tikus Putih (Rattus norvegicus) Galur Wistar dan Sprague-Dawley. Acta VETERINARIA Indonesiana, 6 (2), 32–37. https://doi.org/10.29244/avi.6.2.32-37

65. Sihombing, M., Sulistyowati, T. (2011). Perubahan nilai hematologi, biokimia darah, bobot organ dan bobot badan tikus putih pada umur berbeda. Jurnal Veteriner, 12 (1), 58–64.

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