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Phytochemistry and Haemostatic Activity of Dragon'S Blood Resin (*Dracaena Cinnabari)*

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ABSTRACT

Dracaena cinnabri is a popular medicinal plant in the peninsula of Arabia and other countries, used as an herbal cure for a variety of ailments such as astringent, analgesic, antibacterial, and antiulcer. The present research investigation sought to identify the phytochemical components and assess the hemostatic impact of Dracaena cinnabri extracts in aqueous, ethanol, and chloroform forms. Soxhlet extraction has been employed to isolate and identify secondary metabolites in plants. Several widely used and accessible standard assays were performed for phytochemical screening. Prothrombin Time (PT) and Activated Partial Thromboplastin Time (APTT) are two examples of biochemical assays that are frequently used to examine hemostatic potential. Tukey's HSD and one-way ANOVA were used to evaluate the information. The presence of active substances, including phenolic compounds, flavonoids, tannins, and saponins, in high concentrations was revealed by phytochemical screening. The aqueous extract caused a big drop in both PT and APTT levels, which means it had a high pro-coagulant effect and potentially had a haemostatic effect. The ethanol extract, on the other hand, did not have any haemostatic activity, and the chloroform extract had a mild effect. The remarkable action of the aqueous extract may be ascribed to its elevated concentration of saponins, tannins, and phenolic substances. These results indicate that aqueous extract of Dracaena cinnabari resin exhibits significant in vitro haemostatic properties; still, additional research is required to clarify the precise mechanism of action and validate its clinical significance.

Keywords: *Dragon's blood resin, Dracaena cinnabari, Prothrombin time, Activated partial thromboplastin time*

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INTRODUCTION

Normal blood vessels, blood coagulation, and platelet activities are all components of a normal hemostatic system (Raghunathan *et al*., 2022). An essential component of hemostasis, blood coagulation is the complicated process through which blood forms clots, covering an injured blood vessel wall with a clot that contains platelets and fibrin to block bleeding and initiate vessel repair (Liu, 2024). Damage to the vessel wall exposes the subendothelial components, such as microfibrils, collagen, and the basement membrane (Lin & Davis, 2023). Platelet aggregates known as platelet plugs are formed when platelets cling to the exposed injured endothelium, making the outer membrane more sticky (Scridon, 2022). A higher risk of clotting (thrombosis) or bleeding (hemorrhage) can result from coagulation disorders (Rautou *et al*., 2023). Traditional medicine has been used for centuries to heal illnesses in societies all throughout the world (Ozioma & Chinwe, 2019). Many medicinal plants are used in these indigenous medical systems to create a range of herbal preparations that are used as therapies; these products are generally believed to be safe and free of negative effects (Okaiyeto & Oguntibeju, 2021). The ongoing use of herbal remedies, particularly in underdeveloped nations, has been fueled by the high cost or restricted availability of contemporary pharmaceuticals (Al-Worafi, 2020). According to the World Health Organization (WHO), around 40% of Chinese, 75% of French, 70% of Canadians, 42% of Americans, and 80% of Africans rely on traditional medicine to meet their daily primary health needs (Izah *et al*., 2024). Certain plant extracts have been shown to exhibit biological activity since the World Health Organization created a global categorization of traditional medicine in 1978. Over 170,000 strong phytomolecules have been identified from plants to date (Mensah *et al*., 2019). Natural substances and their biological actions have been a major mystery for many years, and many researchers are working to solve it. Because of the increased interest in using natural products to improve human health worldwide, there are more and more studies on these topics in the literature (Khalil & Mustafa, 2020; Abdulgadir *et al*., 2023; Malik *et al*., 2023; Nguyen *et al*., 2023; Chen *et al*., 2024; Safa & Farkas, 2024; Solmell & Sterner, 2024; Bona *et al*., 2025; Nazzal & Hadi, 2025). In India, research on plant-based extracts' antimicrobial, anti-inflammatory, hepatoprotective, antidiabetic, and other properties has been particularly prevalent (Shakya, 2020). Some pharmacological properties, like the hemostatic properties of plant-based extracts, have not been studied enough (Al-Zahrani *et al*., 2023; Gautam *et al*., 2023; Ghosh *et al*., 2023; Santini *et al*., 2023; Zhang *et al*., 2023; Khan *et al*., 2024; Rojas *et al*., 2024; Ahmed *et al*., 2025; Ali *et al*., 2025; Sousa *et al*., 2025; Ruiz *et al*., 2025). The perennial tree *Dracaena cinnabari* is regional to Socotra Island, which is situated on Yemen's southern coast (Rezende *et al*., 2022). This tree yields a vivid red resin, which has been colorfully referred to as the "blood of the dragon" or "blood of the two brothers." (Wang *et*

al., 2022). A taxonomic classification of the plant is shown in **Table 1**.

Table 1. Taxonomic Classification of *Dracaena cinnabari*

Kingdom	**Plantae**
Subkingdom	Embryophyta
Superdivision	Spermatophytina
Division	Magnoliophyta
Class	Liliopsida
Subclass	Liliidae
Order	Liliales
Family	Asparagaceae
Genus	Dracaena
Species	D. cinnabari

The dry powdered resin is commonly used in the Arabian Peninsula and other countries as an herbal medicine for a range of diseases, including analgesia, astringency, antibacterial, haemostatic, and ulcers; if administered during the first trimester of pregnancy, it can also serve as an abortifacient (Al-Awthan & Bahattab, 2021; Johnson, n.d.). Numerous flavonoids, cinnabarrine, sterols, triterpenoids, and deraconaceae, an old luxury product, have previously been isolated through phytochemical research (Nchiozem-Ngnitedem, 2021). In Arabia, the red liquid extract of damaged bark is known as "cinnabar." The locals of Socotra (Yemen) continue to use it to heal stomach ulcers and diarrhea. (Almaghrebi *et al*., 2024) It has been used for folk magic and as a coloring agent (Basile, 2023). Soqotri Dracaena cinnabari's dragon's blood possesses antibacterial (Zakir *et al*., 2022), antioxidant (Al-Ghorafi & Alburyhi, 2024), antiviral (Mothana *et al*., 2022), and cytotoxic properties (Al-Ghorafi & Alburyhi, 2024). Despite these well-documented pharmacological features, there has been little experimental study into the direct effects of Dracaena cinnabari resin extracts on hemostatic measurements. The purpose of this study was to determine the phytochemical components of Dracaena cinnabari resin extracts prepared with various solvents and to test their capacity to halt bleeding in vitro using standard coagulation assays.

MATERIALS AND METHODS

Plant materials

Dracaena cinnabari resin was obtained from a local market in Mosul, Iraq. The material was authenticated by the taxonomist of the Botany Department at the Agriculture College/University of Mosul (Voucher Specimen Number 346 on 22 Jan 2026); the dried sample was ground into moderate powder. The dried sample was ground into moderate powder.

Chemicals and reagents

High purity grade of all chemicals and reagents; ethanol (Merck, Germany), chloroform (Merck, Germany), prothrombin reagent, and activated partial thromboplastin reagent (Dade Behring Marburg GmbH, Germany) were used.

Preparation of plant extracts

In a Soxhlet apparatus, approximately 100 g of dry powdered *Dracaena cinnabari* resin was exposed to a series of solvent extractions (distilled water, ethanol, and chloroform); Whitman No. 1 filter paper was used to filter the extracts, and a rotary vacuum evaporator was used to concentrate the resulting solutions. The extracts were then placed in amber, tightly closed containers that seemed to be labeled and refrigerated at 4°C for additional tests (Saraf, 2023).

Phytochemical testing

The presence of alkaloids, flavonoids, triterpenoids, saponins, and tannins was evaluated in the resulting extracts based on the previously established extraction techniques and modes. This assessment was executed in accordance with the established methodologies defined by Harborne (Keneni *et al*., 2021).

Alkaloid

For around five minutes, the sample was exposed to ammonia and chloroform. The addition of H_2SO_4 2M came next. It was then shaken to create two layers of acid. After placing the acid layer in three test tubes, the Mayer, Dragendrof and Wagner reagents were added. The developments of an orange precipitate on the Dragendrof reagent, a brown product on the Wagner reagent, and a white product on the Mayer reagent all suggested successful outcomes.

Flavonoid

In the flavonoid test, two tiny pieces of magnesium and concentrated HCl were added to the samples after they had been heated for five minutes. If the reddish color turns orange, the reaction is considered favorable. A 10% NaOH was added after a few isolates had been dissolved in ethanol; a particular color shift indicates a successful reaction.

Triterpenoid

Chloroform, concentrated sulfuric acid, and anhydrous acetic acid were applied to the samples. Triterpenoids produced orange/purple coloration.

Saponin test

After being heated for five minutes, the samples got cold and agitated. The existence of saponins is indicated by a good result for the creation of stable foam or foam that lasts for two to three minutes.

Tannins testing

A solution of 1% $FeCl_3$ and 2 M HCl has been added to the samples. A green-black color shift will occur with a 1% $FeCl_3$ solution, while a red color shift will be shown with a 2M HCl solution.

In vitro haemostatic activity

Using the usual Fisherbrand™ Reagent kits, in vitro assessments, haematological markers PT, and APTT evaluations were conducted in the study groups. For the PT test, 0.01 mL of 5% of every extract solution or NS solution (which was a negative control) was combined with 0.1 mL of plasma, which was followed by incubating for a two-minute period at 37°C. After adding 0.2 mL of heated PT reagent, the coagulator device measured the endpoint, which was the time it took for a clot to form (Mohammed & Mustafa, 2020). For the APTT test, 0.01 mL of 5% of every extract and saline (which was a negative control) was combined with 0.1 mL of plasma. The aforementioned mixes were followed by incubating for three minutes each

around 37°C after 0.1 mL of hot APTT reagent was added. Every sample was then given 0.1 mL of hot $CaCl_2$, and the coagulator device was used to measure the clotting time (Ebrahimi *et al*., 2020).

Statistical analysis

The data was analyzed using Microsoft Excel 8.1 software, subjected to descriptive statistics, and reported as mean ± SEM. One-way analysis of variance (ANOVA) and Tukey's HSD test to find out if the results were statistically significant...*$p<0.05$ denoted statistically significant values.

RESULTS AND DISCUSSION

Result Phytochemical analysis of extracts

the qualitative analyses carried out on each of the three pure chemical components of *Dracaena cinnabari*. According to the laboratory analysis, the aqueous extract of *Dracaena cinnabari* contains terpenoids, saponins, phenol, flavonoids, alkaloids, and tannins; the ethanol extract contains terpenoids, phenol, and tannins; and the chloroform extract contains phenol, flavonoids, tannins, and alkaloids, as indicated in **Table 2**.

Table 2. Results of Phytochemical Analysis

Code Sample	Triterpenoids	Saponins	Phenol	Flavonoids	Tannins	Alkaloids
Aqueous extract	Positive (+)	Positive (+)	Positive (+)	Positive (+)	Positive (+)	Positive (+)
Ethanol extract	Positive (+)	Negative (-)	Positive (+)	Negative (-)	Positive (+)	Negative (-)
Chloroform extract	Negative (-)	Negative (-)	Positive (+)	Positive (+)	Positive (+)	Positive (+)

Effect of Extracts on PT and APTT

PT and APTT assays were used to assess the impact of 5% *Dracaena cinnabari* extracted solutions on the coagulation system. The findings indicated that aqueous extract had the most significant impact on coagulation measures, especially APTT, as seen in **Table 3**; there was a substantial shift in the levels of PT and APTT. The control group's PT and APTT results from NS-added plasma were 12.40±0.43 and 30.00±2.24 seconds, respectively. In comparison to the control group, the aqueous extract reduces PT to 10.90±0.46 seconds and APTT to 13.6±4.96 seconds. The ethanol extract, on the other hand, did not show a significant pro-coagulant action, with PT values of 12.30 ± 0.30 seconds and APTT values of 30.40 ± 2.77 seconds. Chloroform extract reduces PT to 11.6±0.19 and APTT to 25.8±1.36 when compared to the control group. Consequently, only the aqueous extract exhibited a statistically and experimentally significant reduction in APTT, while the ethanol extract showed no coagulation-enhancing action under the current experimental conditions.

Table 3. Human plasma PT and APTT values with 5%*Dracaena cinnabari* extracts solutions and normal saline solution (n=5) ($p<0.05$)

Sample	PT (second)	APTT (second)
N.S (Control)	12.40±0.43	30.00±2.24
Aqueous extract	10.90±0.46	13.60±4.96
Ethanol extract	12.30±0.30	30.40±2.77
Chloroform	11.60±0.19	25.80±1.36
Mean ± SEM is used to express the data. A plasma/saline solution ratio of 10:1 serves as the control group. APTT: activated partial thromboplastin time, PT: prothrombin time.		

Overall, the PT and APTT of handled plasma revealed significant values in Dracaena cinnabri aqueous, ethanol, and chloroform extracts. The aqueous extract had the strongest and most consistent pro-coagulant effect, as evidenced by a large reduction in APTT and a small decrease in PT. This research suggests that there may be an impact on both the intrinsic and extrinsic routes of blood coagulation. Tannins, phenols, and flavonoids are among the phytochemicals linked to a reduction in PT and APTT in processed plasma (Rehman *et al*., 2019). The aqueous extract's high tannin concentration, however, may result in non-specific protein precipitation, which could cause fibrinogen or other plasma proteins to clump together or change shape, giving the appearance of a quicker clotting time in vitro. Therefore, it is impossible to rule out the potential that non-specific tannin–protein interactions are causing the observed drop in APTT, even though it is considerable.

Furthermore, saponins are linked to APTT-induced reductions in plasma coagulation time (Muindi, 2021). These chemicals have a direct link to a drop in Prothrombin Time (PT) in normal plasma (Shen *et al*., 2017). Additionally, extracts containing both phenols and saponins are linked to lower PT levels (Wen *et al*., 2019). Vanillic acid and gallic acid, which are phenolic chemicals, are linked to a drop in plasma PT (Olas *et al*., 2020). Phenoletin, another phenol, has been demonstrated to lower both PT and APTT in treated plasma (Al Abadie *et al*., 2023; Efremov, 2023; Lee & Wu, 2023; Meneses-La-Riva *et al*., 2023; Jin *et al*., 2024; Wang *et al*., 2024; Adams & Hayes, 2025; Clark & Foster, 2025; Kunie *et al*., 2025; Lee *et al*., 2025; Rojas *et al*., 2025). Phenols and flavonoids are generally associated with a reduced coagulation time through the extrinsic pathway (Cui *et al*., 2018). Flavonoids have important blood-clotting properties that speed up the process of plasma coagulation (Ofosu *et al*., 2023). Specifically, the flavonoid astragalin has been shown to significantly shorten PT compared to model groups (Wang *et al*., 2023). In the same way, the flavonoids kaempferol and phloridzin can also shorten normal plasma PT (Yin *et al*., 2018). Tannins have been demonstrated to reduce APTT, which enhances the intrinsic route of the coagulation process (Muindi *et al*., 2021). Ethanol extract of *Dracaena cinnabari*, however, did not demonstrate a significant pro-coagulant impact in this investigation. This finding could be explained through variations in phytochemical composition, since the ethanol extract lacks flavonoids and saponins, which are extracted more abundantly by polar solvents like water. The chloroform extract had a moderate effect, probably caused by the presence of phenolic chemicals and alkaloids; however, it was less active than the aqueous extract. Strong complexes that are created when proteins and tannins are combined are linked to the phytochemical's capacity to reduce coagulation time (Baunthiyal *et al*., 2021). It has been suggested that tannins in

the aqueous extract might enhance fibrinogen-thrombin interactions or increase protein aggregation, impacting the formation of clots in vitro (Gheraibia, 2021; Li *et al*., 2023). By promoting the transition of factor X to Xa through a common process, phenols (found in extracts) are thought to reduce PT and APTT and shorten plasma coagulation time (Lamponi, 2021). Findings show that the pro-coagulant effect identified in this study is mostly related to the aqueous extract of *Dracaena cinnabari*, whereas the ethanol extract appears to be mainly ineffectual under the experimental circumstances used.

CONCLUSION

The results of this study show that the aqueous extract of *Dracaena cinnabari* resin significantly decreases prothrombin time when compared to the control group (normal saline) and has a strong in vitro haemostatic impact. This effect was particularly visible in the significant reduction in APTT, indicating an impact on the intrinsic as well as common coagulation pathways. Conversely, ethanol extract had no significant haemostatic impact, whereas the chloroform extract exhibited a slight decrease in coagulation times. These findings show that the aqueous extract has the highest concentration of polar phytochemicals such as flavonoids, tannins, phenolic compounds, and saponins, which are most likely responsible for the haemostatic activity found in this study. Further research using chemical fingerprinting, fractionation, and other coagulation assays is needed to identify the active compounds and understand the fundamental mechanisms of action. To summarize, the current work shows preliminary in vitro evidence suggesting the haemostatic potential of the aqueous extract of *Dracaena cinnabari* resin; nevertheless, more in vivo and mechanistic studies are required before considering any clinical or therapeutic application.

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