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Comparative Evaluation of Anticoagulant Effects of Curcumin and Ginger Against Warfarin in Rat Models

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ABSTRACT

The rising demand for oral anticoagulants necessitates the investigation of novel alternatives, particularly in light of the limitations associated with Warfarin. Curcumin, the primary bioactive constituent of turmeric, exhibits significant anticoagulant properties, as evidenced by empirical studies indicating its ability to prolong clotting times and reduce thrombin activity, thereby presenting a potential breakthrough in thrombotic disorder management.underscoring the importance of this spice for enhanced quality of life. Material and method :The investigation involved 48 rats categorized into eight groups, with six rats allocated per group. The first group control, the second group cohort received warfarin, the third with turmeric, the fourth with ginger, the fifth with warfarin and curcumin , the sixth with warfarin with ginger , the seventh with curucmin and ginger, and the eighth a combination of warfarin, turmeric, and ginger, to assess the anticoagulant and antiplatelet properties of ginger and curcumin in vivo, employing rat blood samples for comparative analysis against warfarin through various assays including Fibrinogen, Vitamin K, Fibrinogen Degradation Product, Prothrombin time, INR, APTT, bleeding time. Results :Findings revealed that the inclusion of turmeric and ginger enhances the efficacy of warfarin in lowering vitamin K levels while simultaneously prolonging prothrombin time, bleeding time, INR, and clotting duration. The research indicated that turmeric specifically influences fibrinolysis, whereas ginger affects thrombin time. Additionally, the study demonstrated that turmeric and ginger contribute to increased hemoglobin levels. Conclusion: drawn from the research suggests that turmeric and ginger may serve as viable alternatives to warfarin when its adverse effects are unmanageable. The primary objective was to assess the anticoagulant effectiveness of turmeric and ginger in comparison to warfarin.

1. Introduction

Anticoagulant therapy plays a crucial role in the prevention and treatment of thrombotic disorders, which are major contributors to global morbidity and mortality .While conventional anticoagulants like Warfarin have been the mainstay of treatment for decades, there is growing interest in exploring natural compounds with potential anticoagulant properties. (Aggarwal, 2023)(Mazumder et al., 2022).

Warfarin, a vitamin K antagonist, has long been considered the gold standard in anticoagulant therapy. It exerts its anticoagulant effect by inhibiting the enzyme vitamin K epoxide reductase (VKORC1), thereby reducing the synthesis of vitamin K-dependent clotting factors II, VII, IX, and X (Donkol et al., 2023). Despite its efficacy, Warfarin use is associated with significant challenges, including a narrow therapeutic index, numerous drug and food interactions, and the need for regular monitoring of the International Normalized Ratio (INR (In recent years, attention has turned to natural compounds as potential alternatives or adjuncts to traditional anticoagulants (Ferland et al., 2019). Curcumin, the principal bioactive compound in turmeric, has demonstrated promising anticoagulant properties in various studies. It has been shown to inhibit the generation of thrombin and Factor Xa (FXa), key enzymes in the coagulation cascade, affecting both the extrinsic and intrinsic pathways of blood coagulation . Additionally, curcumin has been observed to prolong activated partial thromboplastin time (aPTT) and prothrombin time (PT), indicating a significant anticoagulant effect(Hussain et al., 2022).

Similarly, Ginger has garnered attention for its potential anticoagulant effects. The active compounds in ginger, such as gingerol and shogaol, have been found to interact with the arachidonic acid (AA) cascade, which is crucial in platelet aggregation and thromboxane synthesis (Ahmed et al., 2022).Study have shown that ginger extracts can inhibit platelet aggregation induced by various agonists and prolong prothrombin time in a dose-dependent manner (Crichton et al., 2023). This study aims to compare the anticoagulant effects of two natural compounds, Curcumin (derived from Curcuma longa) and Ginger (Zingiber officinale), with the well-established anticoagulant Warfarin in rat models.

Material and methods

Study design

This study was done at the Veterinary Medicine College of Tikrit University between July 1 and August 1, 2024 at the Animal House after getting approval from the Administrative Board of Tikrit University who provided fifty apparently healthy adult Albino rats aged between 8-10 weeks and weighing between 200-250 grams. The rats were maintained in standard plastic cages under standard conditions, in total, nine groups of six rats each were formed for the study to ensure the environment was standardized for identification of variations that are significant.The study involved 48 rats, segmented into eighth distinct groups, with each group containing six rats. The first group give DMSO 1ml for each rat, the second group received 1mg/kg warfarin orally, the third was administered 100mg/kg turmeric orally, the fourth group just received 200mg/kg ginger orally , , the fifth group was given a combination of warfarin and curcumin ,the sixth group was treated with both warfarin and ginger, the seventh group with curcumin and ginger, while the eighth group was provided with a mixture of warfarin, turmeric, and ginger to thoroughly assess the anticoagulant and antiplatelet properties of ginger and curcumin in vivo. This was accomplished by analyzing the blood samples of the rats and comparing them with warfarin through various assays.

Sample collection

After the trials, blood samples were collected from the retro orbital venous plexus of the rats using capillary test tubes for measuring the biochemical parameters as shown in figure (1). The blood was subject to centrifugation at 3000 revolutions per minute for 15 minutes. The serum was then immediately isolated in Eppendorf tubes (labelled 0.5 mL) and stored at -20˚C until use.

vitro Anticoagulant Test

in vitro anticoagulant activity was determined by measuring Fibrinogen, Vitamin K, Fibrinogen Degradation Product, Prothrombin time, INR, APTT, bleeding time.

Data analysis

The data collected during the study were summarized in sheets of Microsoft Excel 2010. The statistical analysis performed by using IBM-SPSS 26. The normality of these data tested by Shapiro-Wilk test, and the parametric tests were decided to be chosen. Means, and standard

deviations were calculated. The data were comparing by one way ANOVA for the mean differences among the multiple groups under the study, with post hoc test to find the honestly significant difference among the significant results of one way ANOVA. P-value ≤ 0.05 considered as significant.

Results

The comparison of the Vit. K levels among the studied groups was demonstrated in table (1) and figure (1) and the difference was statistically significant (p=0.001). The lower level of Vit. K had the lowest point of (82.06±3.990) in the warfarin group and differed significantly in comparison to control group.

Table (1): The mean and standard deviation of Vit. K in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	222.79 A	11.307	**0.001**
Gr 2: Warfarin	**82.06** BC	**3.990**	
Gr 3: Curcumin	98.36 BC	5.515	
Gr 4: Ginger	179.12 ABC	14.223	
Gr 5: Warfarin+ Curcumin	102.45 BC	9.901	
Gr 6: Warfarin+ Ginger	155.93 ABC	15.075	
Gr 7: Curcumin+ Ginger	105.38 BC	8.257	
Gr 8: Warfarin+ Curcumin+ Ginger	101.87 BC	17.334	
Total	130.99	10.700	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

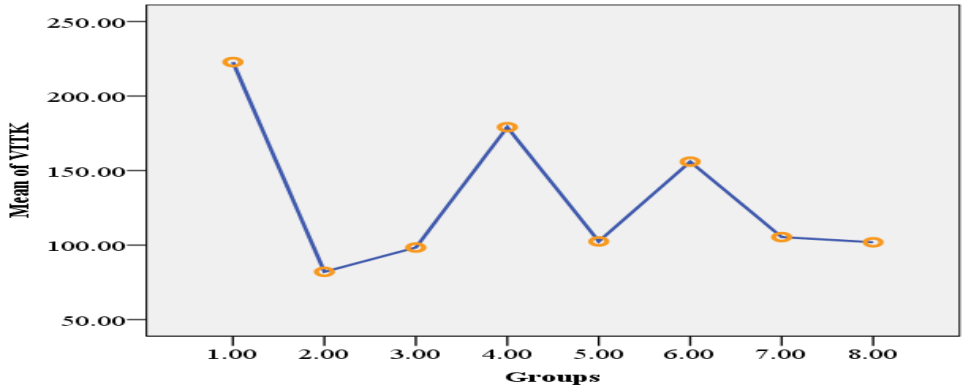

Figure (1): Demonstration of the Vit. K mean levels.

Table (2) and figure (2) showed a statistically significant difference (p=0.000) of FDP mean level among the studied groups, the group 5(Warfarin+ Curcumin) demonstrated the lowest mean level (130.73±27.610) that differed significantly from control group and group 6 (Warfarin+ Ginger).

Table (2): The mean and standard deviation of FDP in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	311.03 AB	18.136	**0.000**
Gr 2: Warfarin	224.41 ABC	15.515	
Gr 3: Curcumin	144.59 C	9.335	
Gr 4: Ginger	243.98 ABC	13.306	
Gr 5: Warfarin+ Curcumin	130.73 C	27.610	
Gr 6: Warfarin+ Ginger	280.41 AB	16.179	
Gr 7: Curcumin+ Ginger	218.99 ABC	8.854	
Gr 8: Warfarin+ Curcumin+ Ginger	214.31 ABC	9.392	
Total	221.06	14.790	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

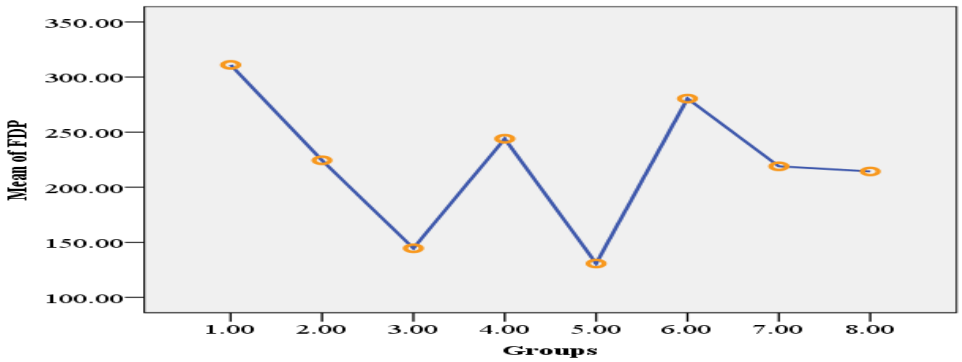

Figure (2): Demonstration of the FDP mean levels.

The mean level of FIB demonstrated a statistically significant difference among the studied groups (p=0.021). The lowest level found among the group 3(Curcumin) with a mean of 69.22±5.294 which statistically differed from control group and group 2 (Warfarin) as shown in table (3) and figure (3).

Table (3): The mean and standard deviation of FIB in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	175.48 A	9.165	**0.021**
Gr 2: Warfarin	173.65 A	7.797	
Gr 3: Curcumin	**69.22** B	**5.294**	
Gr 4: Ginger	86.84 AB	4.558	
Gr 5: Warfarin+ Curcumin	91.83 AB	5.567	
Gr 6: Warfarin+ Ginger	107.80 AB	3.895	
Gr 7: Curcumin+ Ginger	86.06 AB	5.964	
Gr 8: Warfarin+ Curcumin+ Ginger	100.18 AB	2.665	
Total	111.38	5.613	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

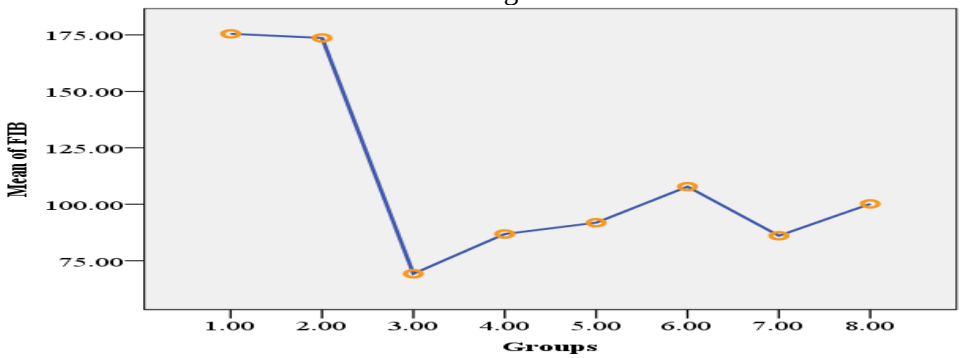

Figure (3): Demonstration of the FIB mean levels.

The PT mean levels were differed significantly among the studied groups at (p=0.000). The highest level was (48.35±1.920) found among the group 8 (Warfarin+ Curcumin+ Ginger) and differed significantly from all the studied groups apart from group 2 (Warfarin) as shown in table (4) and figure (4).

Table (4): The mean and standard deviation of PT in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	17.85 A	1.869	**0.000**
Gr 2: Warfarin	47.65 B	3.066	
Gr 3: Curcumin	26.55 C	4.588	
Gr 4: Ginger	20.42 AC	1.445	
Gr 5: Warfarin+ Curcumin	34.75 D	5.905	
Gr 6: Warfarin+ Ginger	36.82 D	2.171	
Gr 7: Curcumin+ Ginger	30.82 CD	3.597	
Gr 8: Warfarin+ Curcumin+ Ginger	**48.35** B	**1.920**	
Total	32.90	3.070	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

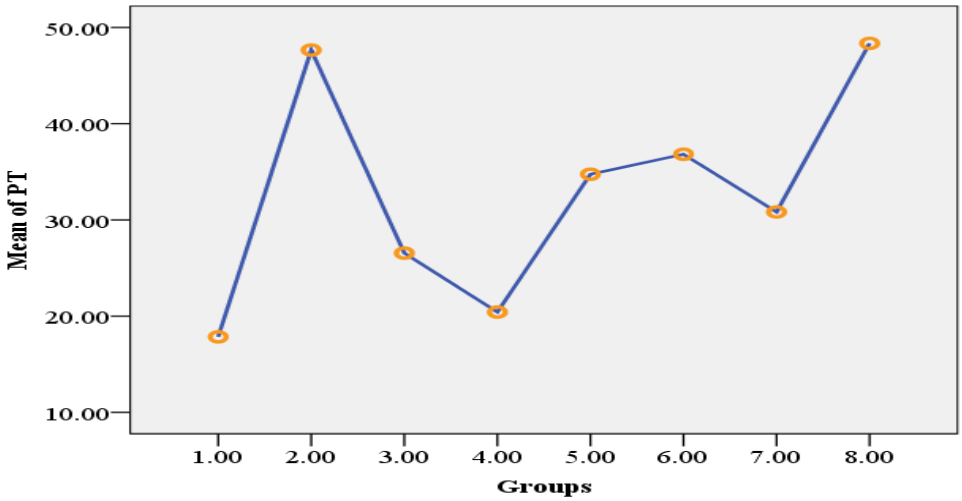

Figure (4): Demonstration of the PT mean levels.

Table (5) and figure (5) showed a statistically significant difference (p=0.009) of PTT mean level among the studied groups, the group 7 (Curcumin+ Ginger) demonstrated the highest mean level (79.07 ±4.419) that differed significantly from control group only.

Table (5): The mean and standard deviation of PTT in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	27.57 A	1.800	**0.009**
Gr 2: Warfarin	47.60 AB	3.283	
Gr 3: Curcumin	72.60 B	4.335	
Gr 4: Ginger	59.60 AB	4.992	
Gr 5: Warfarin+ Curcumin	67.25 AB	2.874	
Gr 6: Warfarin+ Ginger	73.72 B	2.325	
Gr 7: Curcumin+ Ginger	**79.07** B	**4.419**	
Gr 8:Warfarin+ Curcumin+ Ginger	78.22 B	6.437	
Total	63.20	3.808	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

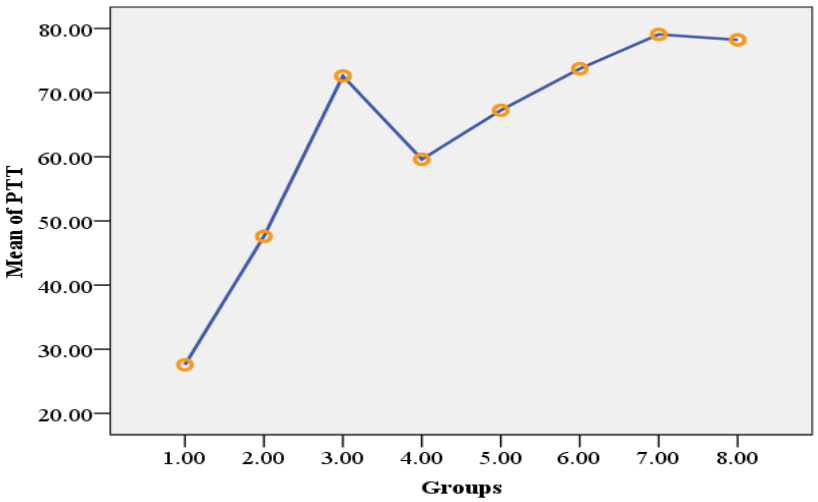

Figure (5): Demonstration of the PT mean levels.

The comparison of the INR levels among the studied groups was demonstrated in table (6) and figure (6) and the difference was statistically significant (p=0.000). The highest level of INR was (4.33±2.026) in the

group 5 (Warfarin+ Curcumin) that differed significantly in comparison to control group, group 2(Warfarin), group 3 (Curcumin), and group 4 (Ginger).

Table (6): The mean and standard deviation of INR in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	1.18 A	0.071	**0.000**
Gr 2: Warfarin	1.61 A	0.103	
Gr 3: Curcumin	1.65 A	0.043	
Gr 4: Ginger	1.53 A	0.069	
Gr 5: Warfarin+ Curcumin	**4.33** B	**2.026**	
Gr 6: Warfarin+ Ginger	2.55 B	0.594	
Gr 7: Curcumin+ Ginger	1.98 AB	0.449	
Gr 8: Warfarin+ Curcumin+ Ginger	2.48 AB	0.807	
Total	2.16	1.187	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

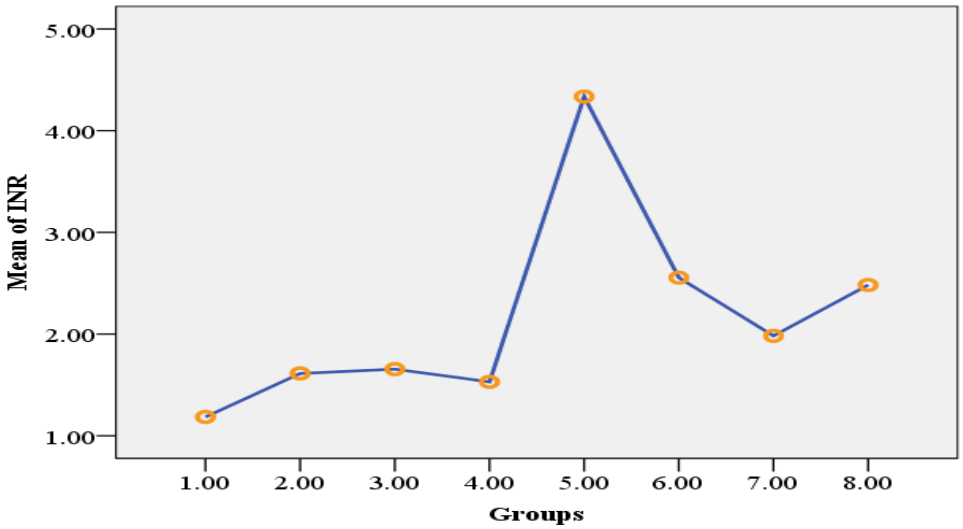

Figure (6): Demonstration of the INR mean levels.

The mean level of bleeding time demonstrated a statistically significant difference among the studied groups (p=0.000). The highest level found among the group 2(Warfarin) with a mean of 139.50±0.648 which statistically differed from all studied groups apart from group 3(Curcumin) and group 8 (Warfarin+ Curcumin+ Ginger) as shown in table (7) and figure (7).

Table (7): The mean and standard deviation of Bleeding Time in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	124.15 A	1.223	**0.000**
Gr 2: Warfarin	**139.50** B	**0.648**	
Gr 3: Curcumin	136.47 BC	2.798	
Gr 4: Ginger	133.00 D	1.177	
Gr 5: Warfarin+ Curcumin	135.50 CD	0.828	
Gr 6: Warfarin+ Ginger	134.57 CD	1.144	
Gr 7: Curcumin+ Ginger	132.55 D	1.217	
Gr 8: Warfarin+ Curcumin+ Ginger	137.70 BC	0.577	
Total	134.18	4.596	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

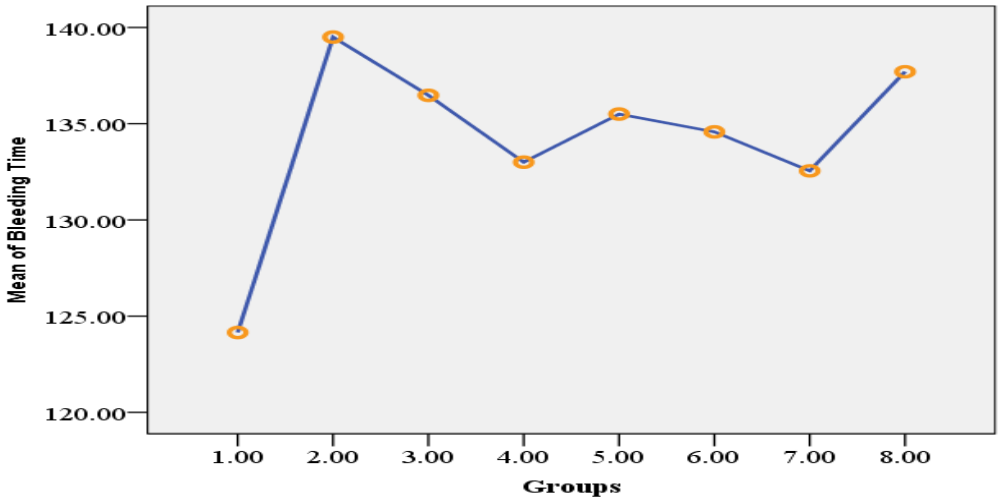

Figure (7): Demonstration of the bleeding time mean levels.

The thrombin time mean levels were differed significantly among the studied groups at (p=0.000). The highest level was (24.22±0.359) found among the group 6 (Warfarin+ Ginger) and differed significantly from all the studied groups as shown in table (8) and figure (8).

Table (8): The mean and standard deviation of Thrombin time in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	12.40 A	0.678	**0.000**
Gr 2: Warfarin	15.15 B	0.465	
Gr 3: Curcumin	12.22 A	0.403	
Gr 4: Ginger	22.82 C	0.750	
Gr 5: Warfarin+ Curcumin	14.20 B	0.483	
Gr 6: Warfarin+ Ginger	**24.22** D	**0.359**	
Gr 7: Curcumin+ Ginger	14.45 B	0.479	
Gr 8: Warfarin+ Curcumin+ Ginger	21.32 E	0.573	
Total	17.10	4.659	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

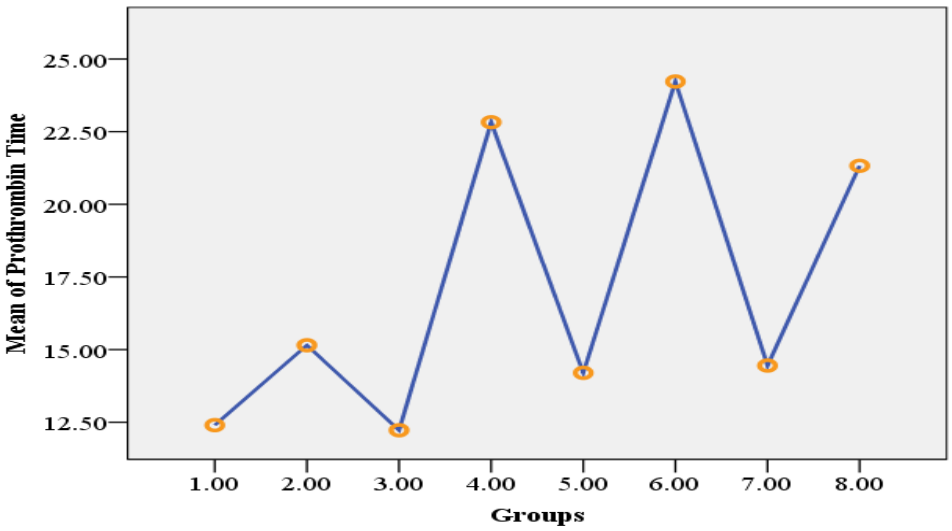

Figure (8): Demonstration of the thrombin time mean levels.

A statistically significant difference was found among the studied groups (p=0.000), in which, group 8 showed the highest activated partial thromboplastin time (52.30±0.683) which differed significantly from all other groups, as demonstrated in table (9) and figure (9).

Table (9): The mean and standard deviation of Activated Partial Thromboplastin Time in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	38.35 A	0.903	**0.000**
Gr 2: Warfarin	45.37 B	0.699	
Gr 3: Curcumin	43.50 C	0.778	
Gr 4: Ginger	44.42 BC	0.694	
Gr 5: Warfarin+ Curcumin	48.07 D	0.377	
Gr 6: Warfarin+ Ginger	46.05 B	0.387	
Gr 7: Curcumin+ Ginger	43.60 C	0.668	
Gr 8: Warfarin+ Curcumin+ Ginger	**52.30** E	**0.683**	
Total	45.20	3.853	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

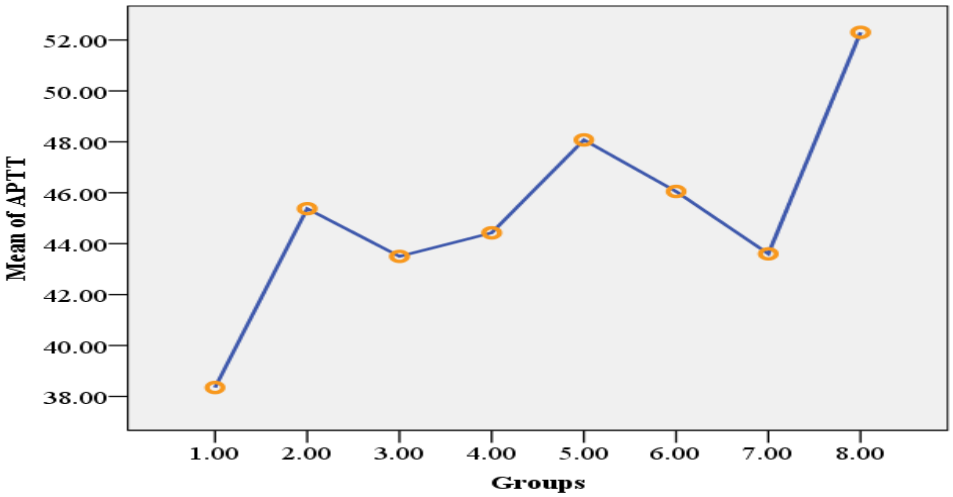

Figure (9): Demonstration of the activated partial thrombin time mean levels.

The comparison of the clotting time among the studied groups was demonstrated in table (10) and figure (10) and the difference was statistically significant (p=0.000). The highest mean level of clotting time was (146.17±0.386) in the group 6 (Warfarin+ Ginger) that differed significantly from all the remaining studied groups.

Table (10): The mean and standard deviation of Clotting Time in experimental group.

Groups	Mean	SD	p-value*
Gr 1: Control Dmso	123.27 A	0.585	**0.000**
Gr 2: Warfarin	140.30 B	0.948	
Gr 3: Curcumin	127.25 C	0.404	
Gr 4: Ginger	125.90 C	0.637	
Gr 5: Warfarin+ Curcumin	143.65 D	0.544	
Gr 6: Warfarin+ Ginger	**146.17** E	**0.386**	
Gr 7: Curcumin+ Ginger	130.87 F	1.117	
Gr 8: Warfarin+ Curcumin+ Ginger	138.97 B	0.525	
Total	134.55	8.364	

*One-Way ANOVA; Similar letters means no significance while different letters means significant difference

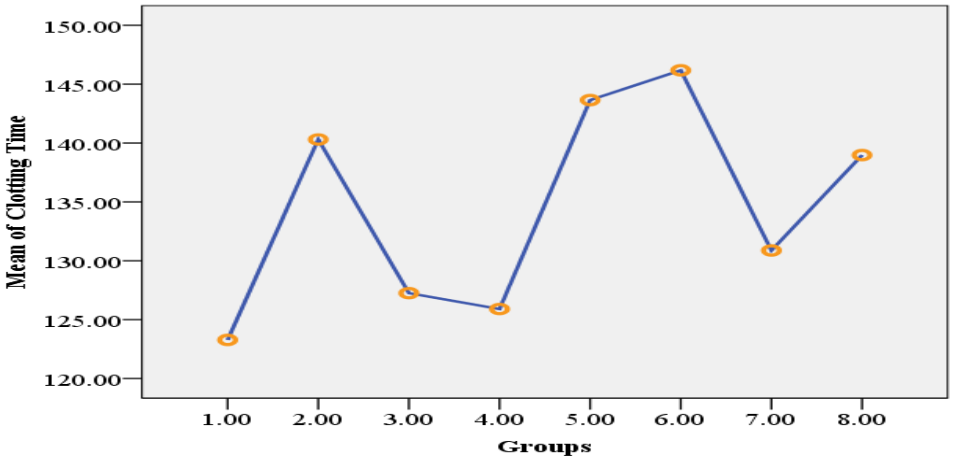

Figure (10): Demonstration of the clotting time mean levels.

Discussion

Warfarin has undesirable side effects and many interactions, so the purpose of the study was to find safe alternatives with fewer side effects and fewer drug interactions. Therefore, curcumin and ginger were chosen because they have beneficial properties and are common herbs (Zuzanna Bober et al., 2018). The results of the present study found that The warfarin group exhibited the reduction in vitamin K levels, significantly differing from the control group. This agree with Sanyaolu et al., 2019 reported warfarin acts by inhibiting the vitamin K cycle, which is crucial for the synthesis of clotting factors II, VII, IX, and X. This inhibition leads to a decrease in the active form of vitamin K, thereby reducing blood coagulation. Also the current finding suggested there were reduction in vit.k level in curcumin or ginger groups .This agree with Yao et al., 2021 found curcumin itself does not directly affect vitamin K levels, its anti-inflammatory properties may indirectly influence the coagulation process by modulating pathways such as NF-κB, which are involved in inflammation and coagulation.similarity, Li, Liang and Sun, 2019 suggested ginger does not directly alter vitamin K levels but may influence the pharmacokinetics of anticoagulants like Warfarin by affecting liver enzymes and inflammatory pathways. Additionally, this study found combination of warfarin with curcumin or ginger there were reduction in vit.k lower than warfarin group. This results agree with study conducted by Burkina et al., 2022 shown that Curcumin can interact with Warfarin, potentially enhancing its anticoagulant effects by inhibiting certain cytochrome P450 enzymes involved in Warfarin metabolism. As well as consistent with Talasaz et al., 2024 reported ginger, albeit in minimal amounts (excluding commercially available ginger-flavored drinks that contain trivial ginger content), can enhance the effects of warfarin.While disagree with Tan & Lee, 2021 Ginger contains gingerols that can mildly impede platelet aggregation; however, its intake at prescribed levels does not markedly influence clotting parameters or the pharmacokinetic and pharmacodynamic profiles of warfarin in healthy individuals.

The current study found that The group (Warfarin + Curcumin + Ginger) exhibited a significantly elevated mean level compared to the control group. Warfarin functions by inhibiting vitamin K, which is essential for the synthesis of clotting factors II, VII, IX, and X, as well as proteins C and S. This inhibition leads to a decrease in these factors, thereby reducing the blood's ability to clot (Gulyaikhina, 2019).

While systematic reviewes conductted by Choi et al., 2017 have shown that ginger does not significantly alter the pharmacokinetic parameters of warfarin, such as its clearance or concentration in the blood. This disagree with the finding of present study. The findings of the current study found warfarin on alter the fibrinogen level this results consistent with A study conducted by Duarte et al., 2021 involving patients with atrial fibrillation on warfarin therapy showed that while warfarin effectively reduced thrombin generation, it did not significantly alter fibrinogen levels when compared to controls. This indicates that while warfarin affects the coagulation cascade, its impact on fibrinogen levels is minimal. Another study by Bootkrajang et al., 2020 focused on the fibrin architecture in patients on warfarin therapy found no significant differences in fibrin density between those on warfarin and healthy controls. This further

supports the notion that warfarin does not significantly affect fibrinogen levels or its structural properties in the blood. Also present study found Curcumin group had lower fibrinogen level this agree with Zhao et al., 2022 found curcumin's role in reducing fibrinogen levels and its stabilization in the presence of plasma proteins suggest potential applications in managing conditions characterized by elevated fibrinogen, such as cardiovascular diseases and coagulopathies. Also agree with Shafik & Abou-Fard, 2016 and Abolfazli et al., 2024 reported the anti-inflammatory and antioxidant properties of curcumin contribute to its effects on fibrinogen levels. By reducing pro-inflammatory cytokines and oxidative stress, curcumin may indirectly influence fibrinogen synthesis and degradation.

As well as this study suggested ginger had no effect to fibrinogen level this consistent with A study by Fakhri et al., 2021 and C. Li et al., 2021 investigated the effects of ginger on various blood parameters, including fibrinogen, in patients with coronary artery disease (CAD). The study found that administering 4 g of powdered ginger daily for three months did not significantly alter fibrinogen levels in these patients.

The results of the present study found (Warfarin+ Curcumin+ Ginger) had higher mean than other studies groups . According to the results of study conducted by Ahmad et al., 2022 found rhizome extracts of Zingiber officinale and Curcuma longa demonstrated inhibition of prothrombin time and activation of partial thromboplastin time in blood samples, signifying an anticoagulant effect, with Zingiber officinale exhibiting a more potent effect compared to Curcuma longa. Keihanian et al., 2018 determined that curcumin influences coagulation by extending prothrombin time (PT) and activated partial thromboplastin time (APTT). Ahmad et al., 2022 estimated the anticoagulant properties of curcumin and its derivatives were evaluated by analyzing APTT, PT, and the production activities of thrombin and activated factor X, revealing that curcumin significantly prolonged APTT and PT while inhibiting thrombin and FXa activities. All this data supported the results of current study. Additionally , Taj Eldin et al., 2016 found the aqueous extract of Zingiber officinale exhibited anticoagulant properties as evidenced by an prolong prothrombin time.

While disagree with Shadrack et al., 2019 reported the methanolic extract of Zingiber officinale demonstrated no anticoagulant effects in rats, with no significant variance observed in prothrombin time, activated partial thromboplastin time, and thrombin time across the studied groups.

The findings of the cureent study found (Warfarin + Curcumin + Ginger) group had higher mean than other studies groups. The studies that agree with this study including a systematic analysis conducted by Morris et al., 2023 of the FDA Adverse Event Reporting System (FAERS) identified that elevated INR is a common adverse drug event in patients taking warfarin. Rubin et al.,2019 found ginger, known for its anticoagulant properties, can interact with warfarin, potentially affecting INR levels. A case report highlighted the pharmacokinetic and pharmacodynamic interactions between ginger and warfarin, suggesting a potential increase in bleeding risk due to enhanced anticoagulation effects. And Soyata et al., 2020 reported Both ginger and curcumin have been identified as herbs that can interact with warfarin, potentially affecting its anticoagulant properties. These interactions are complex and can vary based on individual patient characteristics and the specific formulation of the herbal supplement.

The results of the present study found The combination of Warfarin, Curcumin, and Ginger exhibited the highest statistically significant mean level compared to all other examined groups this findings consistent with Shadrack et al., 2019 indicated that the methanolic extract of Zingiber officinale exhibits antiplatelet properties, with elevated doses notably extending bleeding time in rat models. And A study conducted by Pradana et al., 2022 on male Wistar rats with type 2 diabetes mellitus demonstrated that warfarin significantly prolonged tail bleeding time. As well as in a study carried out by Hussain, 2014 involving aged rats, curcumin administration was found to significantly increase tail bleeding time. All these studies supported the findings of the current study.

While a clinical trial conducted by Edelman et al.,2023 investigating curcumin's effect on bleeding patterns in contraceptive implant users found no significant difference in bleeding or spotting days between the curcumin and placebo groups. This suggests that curcumin may not significantly alter bleeding patterns. Also the current study found that ginger had effect to alter thrombin time this agree with Ajala et al., 2017 indicated that the methanol extract of Zingiber officinale markedly prolong thrombin time. While disagree with Kipyegon, 2020 found zingiber officinale juice exhibited no significant impact on various coagulation parameters including

thrombin time. Also warfarin prolong TT in the current study this agree with Onundarson et al., 2021 and Baylo et al., 2022 findings that show a significant increase in thrombin time by 19.7% after warfarin treatment, highlighting its impact on the coagulation process.

As for clotting time, the current study found that the eighth group had the longest clotting time in comparison with other groups, according to previous studies that support the results of this study. Linconada et al., 2023 found the mean clotting times indicated that ginger leaf extract significantly prolong clotting duration beyond normal upper limits, suggesting its anticoagulant properties. Also Jiang et al., 2022 showed the findings from both the in vitro clotting time tube and coagulation plate methods demonstrated that dried ginger extends coagulation time, suggesting its anticoagulant properties. While disagree with Prasad et al., 2012 found ginger juice treatment (2ml & 4ml/rat, p.o) for 30 days has no impact on clotting time, highlighting its safety and efficacy.

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دراسة التاثير الدوائي لعشبتي الكركم والزنجبيل على سيولة الدم بالمقارنة مع الوارفارين في الجرذان

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الملخص

إن الطلب المتزايد على مضادات التخثر الفموية يستلزم التحقيق في بدائل جديدة، وخاصة في ضوء القيود المرتبطة بالوارفارين. يُظهر الكركمين، المكون الحيوي الأساسي للكركم، خصائص مضادة للتخثر بشكل كبير، كما يتضح من الدراسات التجريبية التي تشير إلى قدرته على إطالة أوقات التخثر وتقليل نشاط الثرومبين، وبالتالي تقديم اختراق محتمل في إدارة الاضطرابات الخثارية. مما يؤكد أهمية هذا التوابل لتحسين نوعية الحياة. المواد والطريقة: شمل البحث 48 جرذ مقسمة إلى ثماني مجموعات، مع تخصيص ستة فئران لكل مجموعة. المجموعة الأولى ضابطة، المجموعة الثانية تلقت الوارفارين، الثالثة مع الكركم، الرابعة مع الزنجبيل، الخامسة مع الوارفارين والكركمين، السادسة مع الوارفارين مع الزنجبيل، السابعة مع الكركمين والزنجبيل، والثامنة مزيج من الوارفارين والكركم والزنجبيل، لتقييم خصائص الزنجبيل والكركمين المضادة للتخثر ومضادة للصفائح الدموية في الجسم الحي، باستخدام عينات دم الفئران للتحليل المقارن ضد الوارفارين من خلال اختبارات مختلفة بما في ذلك الفيبرينوجين، فيتامين ك، ناتج تحلل الفيبرينوجين، زمن البروثرومبين، INR، APTT، زمن النزيف. النتائج: كشفت النتائج أن إدراج الكركم والزنجبيل يعزز فعالية الوارفارين في خفض مستويات فيتامين ك مع إطالة وقت البروثرومبين وزمن النزيف و INR ومدة التخثر في نفس الوقت. وأشار البحث إلى أن الكركم يؤثر بشكل خاص على انحلال الفيبرين، في حين يؤثر الزنجبيل على زمن الثرومبين. بالإضافة إلى ذلك، أظهرت الدراسة أن الكركم والزنجبيل يساهمان في زيادة مستويات الهيموجلوبين. الاستنتاج: تشير النتائج المستخلصة من البحث إلى أن الكركم والزنجبيل قد يعملان كبدائل فعالة للوارفارين عندما تكون آثاره الضارة غير قابلة للإدارة. كان الهدف الأساسي هو تقييم فعالية الكركم والزنجبيل كمضاد للتخثر مقارنة بالوارفارين

الكلمات المفتاحية: مضادات التخثر، الزنجبيل ، كركم لونغا، الوارفارين