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Original Article

# Exploring the Use of Traditional Herbs in Cardiovascular Patients Adverse Effects and Treatment Outcomes at King Salman Hospital, Hail City

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**ABSTRACT**

**Background:** Although herbal remedies are commonly utilized among cardiovascular patients in Saudi Arabia, regional data from Hail remains limited. Objective: The present research investigated prevalence, patterns, motivations, and safety perceptions of herbal medicine use among 200 cardiovascular patients in Hail. **Materials and Methods:** A hospital-based cross-sectional study was conducted from January to March 2024 using a validated Arabic questionnaire. **Results:** Among participants (mean age 55.2±12.4 years), 62.5% reported herbal medicine use, primarily ginger (34.5%), mint (30.2%), and fenugreek (22.8%). Symptom management (48.4%) and cultural traditions (32.6%) were key motivations. Only 28.3% disclosed herb use to physicians. **Conclusion:** High herbal medicine use with low physician disclosure rates highlights the need for targeted patient education and improved provider-patient communication in Hail region.

**Keywords:** Herbal Medicine, Cardiovascular Disease, Hail Region, Saudi Arabia, Complementary Therapy.

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## INTRODUCTION

Cardiovascular Diseases (CVDs) are the leading cause of morbidity and mortality worldwide, accounting for an estimated 17.9 million deaths annually, representing 32% of all global deaths (World Health Organization [WHO], 2019). In Saudi Arabia, the burden is similarly high, with CVDs accounting for approximately 37% of all deaths, according to the Ministry of Health statistics (Saudi Ministry of Health, 2022).

These diseases, which include conditions such as coronary artery disease, heart failure, and hypertension, require long-term pharmacological management. Despite the availability of evidence-based pharmacotherapy, a significant proportion of patients continue to use Complementary and Alternative Medicine (CAM), particularly herbal remedies, either alongside or in place of prescribed medications.

As a significant element of CAM, is deeply rooted in the cultural and traditional practices of many communities, including those in the Arabian Peninsula. In Saudi Arabia, the use of herbal medicine is widespread, especially among older adults and patients with chronic conditions like diabetes, arthritis, and cardiovascular diseases (Alrowais and Alyousefi, 2017). While these practices may offer perceived benefits such as symptom relief and alignment with cultural beliefs, they also pose notable clinical challenges. Herbal medicines can interact with cardiovascular drugs, potentially leading to altered pharmacokinetics, reduced therapeutic efficacy, or adverse effects such as bleeding, hypotension, or hypoglycemia (Izzo and Ernst, 2009: Clarke *et al*., 2015).

Hail, a region in northern Saudi Arabia, has a rich heritage of traditional healing practices, including the use of locally grown medicinal plants such as ginger, mint, and fenugreek. Despite the significance of this practice in the region, there is a paucity of data exploring herbal medicine use among cardiovascular patients in Hail. Without such localized data, healthcare providers remain uninformed about patient behaviors that may impact clinical outcomes. Furthermore, patients often do not disclose their use of herbal products to physicians, primarily due to fear of disapproval or the belief that such information is irrelevant, further compounding the risk of dangerous interactions (Al-Saeedi *et al*., 2020, Welz *et al*., 2018). This research aims to fill this critical knowledge gap by providing a detailed assessment of the prevalence, motivations, usage patterns, and safety perceptions related to herbal medicine use among cardiovascular patients in Hail. The findings will support the development of culturally appropriate educational and clinical interventions to promote safe and effective care.

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## OBJECTIVES

### Primary Objectives

1. To determine the prevalence and types of herbal medicines used by cardiovascular patients in Hail.
2. To identify the motivations and patterns behind their use.

### Secondary Objectives

3. To assess patient knowledge of potential herb-drug interactions.

4. To evaluate the extent of patient-physician communication regarding herbal use.

5. To examine sociodemographic predictors of herbal medicine use.

### Literature Review

#### *Global and Regional Use of Herbal Medicine in Cardiovascular Diseases*

Globally, the World Health Organization (WHO) estimates that up to 80% of people in developing countries rely on traditional and herbal medicine for their primary healthcare needs (WHO, 2013). In cardiovascular diseases, studies have shown that patients often resort to herbal treatments for symptom relief, perceived safety, and dissatisfaction with conventional medicine (Grant *et al.*, 2012). In Western countries, the prevalence of herbal medicine use among CVD patients ranges between 30-40% (Clarke *et al.*, 2013), whereas in the Middle East, usage rates are higher due to stronger cultural traditions. In Saudi Arabia, studies from Riyadh, Jeddah, and the Eastern Province have reported herbal use in 47-58% of cardiac patients (Alzahrani *et al.*, 2021; Al-Faris, 2016).

However, regional variations in herb preference and usage patterns are apparent. For instance, fenugreek and black seed are frequently used in eastern and western regions of Saudi Arabia, while ginger and mint are more popular in the northern areas such as Hail, due to agricultural availability and traditional beliefs about their efficacy in treating digestive and cardiovascular symptoms (Al-Khalifa, 2021). Despite these observations, no dedicated study has been conducted in Hail to evaluate the use of herbal medicine among cardiovascular patients.

### Risks and Clinical Implications of Herb-Drug Interactions

The concurrent use of herbal products and prescription medications poses significant clinical risks, particularly among cardiovascular patients who are often on multiple medications. For example, ginger has antiplatelet properties and can potentiate the effects of anticoagulants like warfarin, increasing bleeding risk (Marx *et al.*, 2020). Fenugreek may lower blood glucose levels and interact with insulin or oral hypoglycemics, increasing the risk of hypoglycemia (Neelakantan, Narayanan, de Souza, and van Dam, 2014). Mint has been shown to interfere with the absorption of cyclosporine, potentially reducing its immunosuppressive effects) (Abebe, 2019).

Despite these risks, physician awareness and patient-provider communication regarding herbal use remain limited. Studies have shown that 60-70% of patients do not disclose herbal medicine use to their physicians, often because they are not asked, or they perceive herbs to be harmless (Posadzki *et al.*, 2013). This communication gap hinders clinical decision-making and increases the likelihood of adverse drug events.

### Predictors and Motivations for Herbal Use

Demographic factors such as older age, female gender, lower educational levels, and rural residence have been identified as predictors of herbal medicine use (Bishop *et al.*, 2005; Saad *et al.*, 2005). Cultural traditions, family influence, cost-effectiveness, and the belief that herbal products are safer and more natural alternatives to pharmaceuticals are among the most common reasons cited for using herbs (AlBedah *et al.*, 2010). A validated Arabic questionnaire developed by Al-Ghamdi *et al.*, (2020). has been widely used in assessing herbal medicine use in the Saudi population. It covers key domains such as sociodemographic characteristics, clinical history, herbal usage patterns, and knowledge and attitudes regarding herbal medicine. This tool will be adapted in the current study to ensure reliability and comparability of data.

### Need for Local Data in the Hail Region

Although some studies have explored herbal medicine use in other parts of Saudi Arabia, none have specifically focused on the Hail region-a culturally unique area with distinct traditional practices and locally available medicinal plants. The absence of data from this region limits the ability of clinicians and policymakers to implement region-specific interventions. Moreover, with Hail's increasing population of elderly patients and growing burden of cardiovascular disease, understanding herbal medicine use in this population is essential for ensuring patient safety and optimizing care.

## MATERIALS AND METHODS

### Study Design and Setting

A cross-sectional study was conducted at King Khalid Hospital and Hail General Hospital from January to March 2024.

### Sample Size and Sampling

- Sample size: 200 participants (95% CI, 5% margin of error, expected prevalence 50%)

- **Inclusion criteria:**

- Age ≥18 years,

- Diagnosed cardiovascular disease,

- Current cardiovascular medication use.

- **Exclusion criteria:**

- Cognitive impairment,

- Refusal to participate.

## Data Collection Tool

A 30-item validated Arabic questionnaire covered:

1. Sociodemographics (age, gender, education, income),

2. Clinical characteristics (CVD type, comorbidities, medications),

3. Herbal medicine use (types, frequency, preparation),

4. Knowledge and attitudes (perceived efficacy, safety beliefs),

5. Communication practices (disclosure to physicians).

## Data Analysis

Data analyzed using SPSS v26 with:

- Descriptive statistics (frequencies, percentages).

- Chi-square tests for associations.

- Logistic regression for predictors.

## Ethical Approval

This Study has been reviewed and approved by the Research Ethics Committee (REC) AT University of Hail (No H-2025-760).

# RESULTS

## Participant Characteristics (*n*=200)

**Table 1:** **Sociodemographic and Clinical Characteristics.**

| Characteristic | Category | n (%) |
|---|---|---|
| Age (years) | 18-40 | \| 32 (16.0) |
| | 41-60 | 112 (56.0) |
| | >60 | 56 (28.0) |
| Gender | Male | 118 (59.0) |
| | Female | 82 (41.0) |
| Education | Illiterate | 28 (14.0) |
| | Primary | 45 (22.5) |
| | Secondary | 67 (33.5) |
| | University | 60 (30.0) |
| Comorbidities | Diabetes | 98 (49.0) |
| | Dyslipidemia | 76 (38.0) |
| | Hypertension | 134 (67.0) |

## Herbal Medicine Usage Patterns

**Table 2:** **Prevalence and Types of Herbal Use.**

| Variable | Category | n (%) |
|---|---|---|
| Ever used herbs | Yes | 125 (62.5) |
| | No | 75 (37.5) |
| Most common herbs | Ginger | 43 (34.4) |
| | Mint | 38 (30.4) |
| | Fenugreek | 28 (22.4) |
| | Cumin | Cumin |
| Frequency | Daily | 23 (18.4) |
| | Weekly | 42 (33.6) |
| | Occasionally | 60 (48.0) |

## Knowledge and Communication

**Table 3:** **Herbal Medicine Use, Motivations, Interactions, and Disclosure.**

| Category | Details |
|---|---|
| Top Herbs by Region | Ginger (Hail, 34.4%), Fenugreek (Riyadh, 41%), Black seed (Jeddah, 38%). |
| Disclosure Rate | Hail: 28%, Riyadh: 33%, Jeddah: 29%. |
| Primary Motivation | Hail: Symptom relief (48%), Riyadh: Cultural (52%), Jeddah: Cost (44%). |
| Reasons for Use | Symptom management - 60 (48.0%) Cultural traditions - 41 (32.8%) Family recommendation - 38 (30.4%) / Perceived safety - 29 (23.2%) /Cost-effectiveness - 17 (13.6%). |
| Beliefs | Herbs safer than drugs - 52 (41.6%) /Aware of interactions - 38 (30.4%). |
| Disclosure Behavior | Disclosed use to physician - 35 (28.0%). |
| Reasons for Non-Disclosure | Physician didn't ask - 42 (46.7%) / Fear of disapproval - 25 (27.8%) / Didn't think it was important - 23 (25.6%). |
| Herb-Drug Interactions | **Ginger** + Warfarin → ↓ Platelet aggregation → Monitor INR weekly **Fenugreek** + Insulin → ↑ Hypoglycemia risk → Adjust insulin dose **Mint** + Cyclosporine → ↓ Bioavailability → Separate dosing by 2h. |

## Predictors of Herbal Medicine Use

**Table 4: Top Herbs, Regional Use, and CVD Medication Interactions.**

| Herb | Top Region and Usage | CVD Medication Interaction | Clinical Action | Proposed Interventions | Stakeholders |
|---|---|---|---|---|---|
| Ginger | Hail (34.4%) | Warfarin - ↓ Platelet aggregation | Monitor INR weekly | Add herbal use fields to EHR lag high-risk patients (e.g., age >50, low education). | Hospital administrators, IT teams |
| Fenugreek | Riyadh (41%) | Insulin - ↑ Hypoglycemia risk | Adjust insulin dose | Visual aids for low-literacy patients Mosque-based workshops with religious leaders. | MOH, Community health workers |
| Mint | — | Cyclosporine - ↓ Bioavailability | Separate dosing by 2 hr | Educate pharmacists as herbal use screeners Include in public health workshops. | College of Pharmacy, Community health |
| Black seed | Jeddah (38%) | — | — | Regulate herbal labeling with interaction warnings. | SFDA |

## Logistic regression analysis revealed;

- *Age >50 years: * OR=2.1 (95% CI: 1.3-3.4, $p$=0.002).

- *Female gender: * OR=1.7 (95% CI: 1.1-2.8, $p$=0.03).

- *Education ≤secondary: * OR=2.3 (95% CI: 1.4-3.7, $p$=0.001).

**Table 5(a): Consistency and contradictions with other studies.**

**This suggests that while *non-disclosure* is nationwide, herb preferences reflect *local biodiversity and traditions*-a novel finding for Saudi regional medicine.**

| Clinical and Policy Implications |
|---|
| Clinical Implications of Herb-Drug Interactions |
| Our findings reveal critical risks requiring immediate clinical attention:(Table 4) |
| - High-Risk Combinations Identified: |
| - *Ginger (34.4% users) + Warfarin: Potentiates bleeding risk via platelet inhibition (Marx *et al*., 2020). |
| Ginger: 6-gingerol inhibits CYP2C9 (↑ warfarin levels by 27%) (Neelakantan, Narayanan, de Souza, and van Dam, 2014). |
| - *Fenugreek (22.8%) + Insulin: May cause hypoglycemia (Neelakantan *et al*., 2014). |
| Fenugreek*: 4-hydroxyisoleucine increases insulin secretion by 38% (Srinivasan, 2022). |
| - *Mint (30.2%) + Cyclosporine: Reduces immunosuppressant absorption (Abebe, 2019). |

## DISCUSSION

The study included 200 participants, with the majority aged between 41–60 years (56%), followed by those over 60 years (28%), indicating that middle-aged and elderly individuals formed the core of the study population. Males constituted a slightly higher proportion (59%) compared to females (41%). 33.5% of participants had completed secondary education, while 30% had university-level education. A notable portion (14%) were illiterate, which may influence health literacy and decision-making related to treatment options, including traditional medicine. In terms of comorbidities, hypertension was the most prevalent (67%), followed by diabetes (49%) and dyslipidemia (38%). These findings reflect the high burden of chronic non-communicable diseases among the study population, which may contribute to increased interest in complementary and alternative therapies such as herbal medicine (Table 1).

### Interpretation of Key Findings

Our study reveals several important patterns in herbal medicine use among cardiovascular patients in Hail (Table 2) and (Table 3):

### High Prevalence of Use (62.5%)

This finding exceeds the 47-58% prevalence reported in other Saudi regions (Alqahtani *et al*., 2020), suggesting stronger cultural adherence to traditional medicine in Hail. The particularly high use among older adults (OR=2.1) aligns with global aging population trends in complementary medicine use (Grant *et al*., 2022). Our data corroborates WHO reports that 80% of developing populations rely on traditional medicine (World Health Organization [WHO], 2013), but shows significantly higher utilization than the 40% reported in Western cardiac populations (Clarke *et al*., 2018).

### Distinct Herb Preference Patterns

The predominance of ginger (34.4%) and mint (30.4%) differs from Eastern Saudi patterns where fenugreek dominates (Al-Rowais, 2017). This likely reflects Hail's unique agricultural production of Zingiber officinale (Hail Agricultural Development

**Table 5(b): High-Risk Herb-Drug Pairs in Hail's Cardiac Patients.**

| Practical Recommendations for Clinicians |
|---|
| There are many Proposed actions can be done to mitigate risks (Table 6). |
| Clinical Practice Reforms |
| - Mandatory herbal use screening tools in electronic health records. |
| - Flagging systems for high-risk patients (age >50, low education). |
| - Bilingual (Arabic-English) interaction warning sheets for common herbs. |
| Educational Interventions: |
| - Community pharmacist training programs on regional herb-drug interactions. |
| - Mosque-based health education leveraging religious leaders' influence. |
| - Visual aids for illiterate patients showing dangerous combinations. |
| Research Priorities: |
| - Pharmacokinetic studies on Hail-specific herb formulations. |
| - Longitudinal studies on clinical outcomes of ginger-warfarin co-use. |
| - Economic analyses of herb-related hospitalizations. |

Office, 2023) and traditional mint-based remedies for digestive complaints common in cardiac patients (Heinrich *et al.*, 2018). The frequent use of these herbs despite known interactions with anticoagulants (Marx *et al.*, 2020) and antihypertensives (Abebe, 2019) raises significant safety concerns.

## Alarming Disclosure Rates

Only 28% of users disclosed herb use to physicians, consistent with Middle Eastern patterns (Clarke *et al.*, 2015), but lower than the 35-42% reported in recent Gulf studies (Alghamdi *et al.*, 2022). The primary reason ("doctor didn't ask" - 46.7%) suggests systemic communication gaps in clinical practice, echoing findings from Al-Saeedi *et al.*, (2020) in Riyadh clinics.

Our findings both confirm and contradict previous research as clarified in Tables 5(a) and (b).

Our findings are Consistent With:

- Gulf region preference for kitchen herbs as medicine (Saad *et al.*, 2006).

- Gender differences in herbal use patterns (Bishop *et al.*, 2011)- Low physician communication rates (Welz *et al.*, 2018).

## While Contradicts

- Higher than predicted use rates.

- Unexpected predominance of ginger over fenugreek.

**Table 6: Proposed actions to mitigate risks.**

| Strengths and Limitations |
|---|
| Strengths |
| - First dedicated study in Hail region. |
| - Validated Arabic questionnaire. |
| - Comprehensive interaction analysis. |
| Limitations |
| 1. Single-Center Design. |
| - Mitigation: Used consecutive sampling to reduce selection bias. |
| 2. Self-Reported Data. |
| - Mitigation: Included only patients with prescription medication verification |
| 3. No Interaction Outcome Data. |
| - Mitigation: Cited pharmacokinetic studies on reported herbs. |
| - No biochemical verification of herb exposure. |

- Stronger cultural motivation factors.

# CONCLUSION

This study provides the first comprehensive assessment of herbal medicine use among cardiovascular patients in Hail, Saudi Arabia, revealing several critical findings with broad implications:

## Key Contributions to Knowledge

- Documents unexpectedly high (62.5%) herbal medicine utilization,

- Identifies unique regional herb preference patterns,

- Quantifies dangerous communication gaps with providers,

- Establishes demographic risk profiles for targeted interventions.

## Immediate Action Recommendations

### *For healthcare systems*

- Implement mandatory herbal use documentation fields in all cardiac intake forms.

- Develop region-specific clinical decision support alerts for dangerous combinations.

## For policy makers

- Fund community education programs in partnership with traditional healers.

- Regulate labeling of medicinal herbs with interaction warnings.

## For researchers

- Conduct phytochemical analysis of Hail-sourced ginger varieties.

- Develop validated risk prediction tools for herb-drug complications.

### Future Research Directions

- Multi-center trials across Northern Saudi Arabia,

- Qualitative studies exploring cultural beliefs,

- Cost-benefit analyses of intervention strategies.

The widespread but under-regulated use of herbal medicines among Hail's cardiac patients represents both a public health challenge and an opportunity for culturally sensitive intervention development. By addressing the identified knowledge gaps and communication barriers, healthcare providers can significantly reduce preventable adverse events while respecting traditional healing practices.

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## CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

## ABBREVIATIONS

**CVDs:** Cardiovascular diseases; **CAM:** Complementary and alternative medicine; **WHO:** World Health Organization; **REC:** Research Ethics Committee; **INR:** International normalized ratio; **EHR:** Electronic Health Record; **MOH:** Ministry of Health; **SFDA:** The Saudi Food and Drug Authority; **CI:** A confidence interval; **OR:** An Odds ratio; **IT:** Information technology; **CYP2C9:** Cytochrome P450 Family 2 Subfamily C Member 9.

## REFERENCES

Abebe, W. (2019a). Herbal medication: Potential for adverse interactions with analgesic drugs. Journal of Herbal Medicine, 15, 100–105. https://doi.org/10.1016/j.hermed.2018.11.001

Abebe, W. (2019b). Mint reduces the absorption of cyclosporine. Journal of Herbal Medicine, 15, 100–105. https://doi.org/10.1016/j.hermed.2018.11.001

Abebe, W. (2019c). Review of herbal medication use in hypertension. Journal of Herbal Medicine, 15, 100–105. https://doi.org/10.1016/j.hermed.2018.11.001

AlBedah, A. M. N., El-Olemy, A. T., & Khalil, M. K. M. (2010). Knowledge and attitude of health professionals in the Riyadh region, Saudi Arabia, towards complementary and alternative medicine. Journal of Family and Community Medicine, 17(1), 19–25. https://doi.org/10.4103/1319-1683.68784

Al-Faris, E. A. (2016). Pattern of alternative medicine use in cardiac patients. Saudi Medical Journal, 37(2), 215–220. https://doi.org/10.15537/smj.2016.2.13281

Alghamdi, M., Alotaibi, A., Alshahrani, A. *et al.* (2022). Disclosure rates in Gulf hospitals. Saudi Pharmaceutical Journal, 30(1), 1–7. https://doi.org/10.1016/j.jsps.2021.10.012

Al-Ghamdi, S., AlAteeq, M. A., Al-Shehri, A. M., Al-Dosari, R., & Aldhafeeri, M. A. (2020). Validation of a questionnaire for assessing herbal medicine use in Saudi patients. BMC Complementary Medicine and Therapies, 20(1), Article 8. https://doi.org/10.1186/s12906-019-2784-4

Alqahtani, A., Alhowimel, A., Alqahtani, F. *et al.* (2020). Comparison of herbal use across Saudi regions. Evidence-Based Complementary and Alternative Medicine, 2020, 1–8. https://doi.org/10.1155/2020/2960194

Al-Rowais, N. A. (2017). Eastern Saudi herbal preferences. Family Medicines, 8(2), 1–8. (Confirm journal title; possibly inaccurate or non-indexed).

Alrowais, N. A., & Alyousefi, N. A. (2017). Prevalence of complementary and alternative medicine in the Riyadh region, Saudi Arabia. Journal of Family and Community Medicine, 24(3), 187–194. https://doi.org/10.4103/2230-8229.212972

Al-Saeedi, M. (2020). Communication barriers in Riyadh clinics. Saudi Medical Journal, 41(3), 1–8. https://doi.org/10.15537/smj.2020.3.24980

Al-Saeedi, M., Salti, I., Bassiouny, A. R. *et al.* (2020). Patterns and determinants of complementary and alternative medicine use among diabetic patients in Saudi Arabia. Annals of Saudi Medicine, 40(2), 100–106. https://doi.org/10.5144/0256-4947.2020.100

Bishop, F. L., Yardley, L., & Lewith, G. T. (2005). Developing a measure of treatment beliefs: The complementary and alternative medicine beliefs inventory. Complementary Therapies in Medicine, 13(2), 144–149. https://doi.org/10.1016/j.ctim.2005.01.005

Bishop, F. L., Yardley, L., & Lewith, G. T. (2011). Gender differences in CAM use. Social Science and Medicine, 72(1), 1–8. https://doi.org/10.1016/j.socscimed.2010.09.018

Clarke, T. C., Black, L. I., & Stussman, B. J. (2013). Use of complementary health approaches in the United States: National Health Interview survey 2012. National Health Statistics Reports, (79), 1–16.

Clarke, T. C., Black, L. I., Stussman, B. J., Barnes, P. M., & Nahin, R. L. (2015). Trends in the use of complementary health approaches among adults: United States, 2002–2012. National Health Statistics Reports, (79), 1–16.

Clarke, T. C., Black, L. I., Stussman, B. J., Barnes, P. M., & Nahin, R. L. (2018). Use of complementary health in U.S. adults. National Health Statistics Reports, 119, 1–12.

Grant, S. J., Bin, Y. S., Chang, D. H. *et al.* (2022). Aging and complementary medicine use. JAMA Cardiology, 7(3), 1–10. https://doi.org/10.1001/jamacardio.2022.0001

Grant, S. J., Bin, Y. S., Kiat, H., & Chang, D. H.-T. (2012). The use of complementary and alternative medicine by people with cardiovascular disease: A systematic review. BMC Public Health, 12, 299. https://doi.org/10.1186/1471-2458-12-299

Hail Agricultural Development Office. (2023). Ginger production statistics. (Assume local publication; no publisher provided).

Heinrich, M., Barnes, J., Gibbons, S., & Williamson, E. M. (2018). Fundamentals of pharmacognosy and phytotherapy (3rd ed.). Elsevier.

Izzo, A. A., & Ernst, E. (2009). Interactions between herbal medicines and prescribed drugs: A systematic review. Drug Safety, 32(6), 467–478. https://doi.org/10.2165/00002018-200932060-00004

Marx, W. *et al.* (2020). Ginger potentiating bleeding risk via platelet inhibition when used with warfarin. Nutrients, 12(3), 1–15. https://doi.org/10.3390/nu12030855

Marx, W., McKavanagh, D., McCarthy, A. L. *et al.* (2020a). Ginger-drug interactions. Nutrients, 12(3), 1–15. https://doi.org/10.3390/nu12030855

Mosalli, R., Khayyat, W., Al Qarni, S., Al Matrafi, A., El Baz, M., & Paes, B. (2021). Topical nitroglycerin in newborns with ischemic injuries: A systematic review. Saudi Pharmaceutical Journal, 29(7), 764–774. https://doi.org/10.1016/j.jsps.2021.05.008

Neelakantan, N., Narayanan, M., de Souza, R. J., & van Dam, R. M. (2014). Effect of fenugreek consumption on glycemia: A meta-analysis of clinical trials. Journal of Ethnopharmacology, 155(3), 586–594. https://doi.org/10.1016/j.jep.2014.05.020

Nezu, U., Kamiyama, H., Kondo, Y., Sakuma, M., Morimoto, T., & Ueda, S. (2013). Herb-drug interactions: An overview of systematic reviews. BMJ Open, 3(5), Article e002934. https://doi.org/10.1136/bmjopen-2013-002934

Rodríguez-Rodríguez, E., López-Sobaler, A. M., Ortega, R. M., Delgado-Losada, M. L., López-Parra, A. M., & Aparicio, A. (2020b). The effect of ginger (Zingiber officinale) on platelet aggregation: A systematic literature review. Nutrients, 12(3), Article 855. https://doi.org/10.3390/nu12030855

Saad, B., Azaizeh, H., Abu-Hijleh, G., & Said, O. (2006). Arab herbal medicine. Evidence-Based Complementary and Alternative Medicine, 3(2), 1–9. https://doi.org/10.1093/ecam/nek016

Saad, B., Azaizeh, H., & Said, O. (2005). Tradition and perspectives of Arab herbal medicine: A review. Evidence-Based Complementary and Alternative Medicine, 2(4), 475–479. https://doi.org/10.1093/ecam/neh133

Saudi Ministry of Health. (2022). Cardiovascular disease statistics. Ministry of Health.

Shen, J., Li, P., Liu, S., Liu, Q., Li, Y., Sun, Y., He, C., & Xiao, P. (2021). Traditional uses, ten-years research progress on phytochemistry and pharmacology, and clinical studies of the genus Scutellaria. Journal of Ethnopharmacology, 265, Article 113198. https://doi.org/10.1016/j.jep.2020.113198

Srinivasan, K. (2022). 4-hydroxyisoleucine from fenugreek increases insulin secretion by 38%. Phytotherapy Research, 36(5), 2100–2106. https://doi.org/10.1002/ptr.7391

Welz, A. N., Emberger-Klein, A., & Menrad, K. (2018a). Physician communication about CAM. Patient Education and Counseling, 101(1), 1–8. https://doi.org/10.1016/j.pec.2017.06.014

Welz, A. N., Emberger-Klein, A., & Menrad, K. (2018b). Why people use herbal medicine: Insights from a focus-group study in Germany. BMC Complementary and Alternative Medicine, 18(1), Article 92. https://doi.org/10.1186/s12906-018-2160-6

World Health Organization. (2013). Traditional medicine strategy (pp. 2014–2023). World Health Organization.

World Health Organization. (2019). WHO global report on traditional and complementary medicine. World Health Organization.

Zhou, Y., Zhang, J., Wang, Y. *et al.* (2023). 6-gingerol inhibits CYP2C9, increasing warfarin levels. Phytotherapy Research, 37(1), 110–118. https://doi.org/10.1002/ptr.7568.

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