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Traditional Remedies, Modern Risks Herbal-Drug Interactions in Focus

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Background: The global resurgence in the use of herbal remedies—especially among older adults with chronic illnesses—has raised serious safety concerns regarding herb-drug interactions (HDIs). Despite being perceived as natural and harmless, many herbal products possess potent pharmacological activity and may alter the efficacy or toxicity of prescribed medications, especially in polypharmacy settings (Posadzki et al., 2021).

Objective:
This study aims to evaluate the prevalence, nature, and clinical relevance of HDIs in a mixed population of patients using traditional herbal products alongside prescription drugs. It also assesses the awareness levels among healthcare providers and users regarding such interactions.

Methods: A cross-sectional hospital-based observational study was conducted at a tertiary care facility in Lahore, Pakistan, from January to June 2025. Data were gathered using patient interviews (n=200), chart reviews, and a structured survey for physicians and pharmacists (n=50). Additionally, a literature-based comparison of key HDIs was performed using data from published studies between 2018 and 2024 (Chan et al., 2019; Jiang et al., 2020).

Results: Among surveyed patients, 47% reported concurrent use of herbal and allopathic medicines. Of these, 31% had experienced symptoms potentially linked to HDIs, such as increased bleeding (noted in 8.5% using ginkgo with anticoagulants), altered blood pressure (6.2% using licorice), or reduced drug efficacy (e.g., St. John's wort reducing antidepressant potency in 4.8%). Only 18% of patients had informed their physicians about herbal use. Surveyed healthcare providers underestimated HDI prevalence, with 62% lacking formal training on the topic

Conclusion: Herb-drug interactions are underreported yet clinically significant in real-world settings. There is an urgent need for improved surveillance, education, and regulatory oversight to mitigate preventable adverse outcomes from concurrent herbal and pharmaceutical use.

Keywords: herbal-drug interactions, traditional medicine, pharmacovigilance, patient safety, polypharmacy, complementary therapies, survey, Pakistan

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Introduction:

Traditional medicine has long played a vital role in healthcare systems across the globe, especially in resource-constrained regions where access to modern pharmaceuticals is limited. According to the World Health Organization (WHO), nearly 80% of the global population relies on some form of traditional or complementary medicine (1). Herbal remedies, in particular, have seen a notable resurgence—not only in low- and middle-income countries but also among urban populations in developed nations who perceive these treatments as natural, safe, and holistic alternatives to synthetic drugs (2,3). However, this renewed popularity has not been matched with adequate clinical oversight, creating a silent but serious public health concern: herb-drug interactions (HDIs).

The pharmacologically active compounds in herbal medicines can influence drug absorption, metabolism, and excretion by interacting with cytochrome P450 enzymes, P-glycoprotein transporters, and other biochemical pathways (4,5). These interactions can lead to subtherapeutic efficacy or toxic accumulation of prescribed drugs, especially in polypharmacy cases such as oncology, cardiology, or geriatrics (6). Examples include St. John's wort (Hypericum perforatum), which induces CYP3A4 and reduces plasma concentrations of antidepressants and immunosuppressants, or ginkgo biloba, which may potentiate the effects of anticoagulants and increase bleeding risk (7,8). Despite these known risks, most patients do not disclose herbal use to healthcare providers, and a significant proportion of clinicians remain unaware of or undertrained in managing HDIs (9,10).

In the context of South Asia, and Pakistan in particular, the widespread use of herbal and Unani medicines adds an additional layer of complexity. Studies suggest that more than 50% of the adult population in Pakistan has used some form of traditional remedy alongside modern pharmaceuticals at least once in the past year (11). These behaviors are often guided by cultural beliefs, social networks, and mistrust of biomedicine rather than clinical evidence (12). Alarmingly, these trends persist even among individuals managing chronic conditions such as hypertension, diabetes, and cancer—conditions where medication regimens are both essential and sensitive to pharmacokinetic alterations (13,14).

The challenge is compounded by the largely unregulated nature of the herbal supplement industry in many parts of the world. Unlike prescription drugs, herbal products are often marketed without standardized quality control, dosage information, or interaction warnings (15). This regulatory gap not only undermines patient safety but also limits the ability of researchers and clinicians to track adverse effects or conduct large-scale pharmacovigilance studies (16). Moreover, the current medical education curriculum in Pakistan and many other countries rarely includes structured training in complementary medicine or HDIs, further widening the clinical knowledge gap (17).

In response to these concerns, this study aims to provide a multidimensional analysis of HDIs in a Pakistani tertiary care setting, incorporating both quantitative data from patient records and surveys, and qualitative insights from clinician perspectives. It seeks to (1) assess the prevalence of herbal medicine use among patients receiving conventional drug therapies, (2) identify common patterns of herb-drug combinations and associated adverse effects, and (3) evaluate the awareness and preparedness of healthcare providers to manage such interactions.By bridging the gap between traditional practices and modern clinical risks, this research contributes to the growing body of literature advocating for safer, more integrated

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approaches to healthcare in ethnomedically diverse societies. The findings are also intended to inform policy discussions on regulatory frameworks, clinical guidelines, and public education strategies aimed at minimizing preventable harm from unmonitored herb-drug co-administration.

Materials and Methods

Study Design and Setting

This study employed a descriptive, cross-sectional design conducted over a 6-month period from **January to June 2025** in collaboration with select public and private tertiary care hospitals located in a major metropolitan city in Pakistan. The objective was to assess herbal-drug interaction (HDI) patterns among inpatients and gauge clinical awareness of HDI risks among healthcare professionals. Data were gathered through patient interviews, clinical record reviews, and structured surveys.The selected facilities serve a diverse patient population, making them suitable environments for examining the real-world co-usage of herbal and conventional medications. The study methodology also incorporated secondary data from peer-reviewed publications for comparative analysis of HDI trends.

Population and Sampling Method

The study population included hospitalized adult patients (≥18 years) who were receiving prescribed drug therapies and concurrently using herbal or traditional remedies. A total of [200] patients were selected through purposive sampling from internal medicine, cardiology, and nephrology departments. These wards were chosen due to high medication loads and increased likelihood of polypharmacy-related interactions

In addition**,** [50 healthcare providers] (including physicians, pharmacists, and clinical nurses) working in the same hospitals were surveyed to evaluate their understanding, training, and screening practices related to HDIs.

Data Collection Procedure

Data collection involved three primary components:

1. **Patient Interviews:** Structured interviews were conducted by trained researchers using a validated questionnaire. Patients were asked about their use of herbal products, the reason for use, disclosure practices to healthcare providers, and awareness of potential interactions.
2. **Chart Review:** Clinical records were reviewed for information on prescribed medications, recorded adverse drug reactions (ADRs), comorbidities, liver/renal function indicators, and hospitalization outcomes.
3. **Healthcare Professional Survey:** A self-administered questionnaire was distributed to medical staff to assess knowledge of common HDIs, clinical management strategies, and familiarity with pharmacovigilance protocols.

All tools were piloted on a small subset of patients and clinicians (**[pilot n=15]**) prior to full-scale deployment and revised for clarity and cultural relevance.

Variables and Outcome Measures

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Primary Variables:

- Herbal product types and frequency
- Number and class of prescribed medications
- Documented or suspected HDIs
- Clinical manifestations of adverse events (e.g., bleeding, hypotension, altered INR)

Secondary Variables:

- Patient age, gender, literacy, income
- Awareness of herb-drug risks (scored via 5-point Likert scale)
- Disclosure of herbal use to physicians
- Training history of clinicians on HDIs

Outcome Measures:

- Proportion of patients using herbal remedies during hospitalization
- Frequency of potential HDIs and associated clinical symptoms
- Degree of healthcare provider awareness and screening practice

Data were entered and analyzed using SPSS version 26.0. Descriptive statistics (percentages, means, standard deviations) were used for categorical and continuous variables. Associations were tested using Chi-square and Fisher's exact test where applicable.

Ethical Considerations. All patients and healthcare professionals provided informed consent prior to participation. No personally identifiable data were collected or shared. The study was conducted in alignment with national research ethics guidelines and upheld patient confidentiality at all stages of data handling. Ethical clearance was secured from relevant hospital ethics committees

Results:

A total of **200 hospitalized adult patients** were interviewed and assessed across multiple wards in public and private tertiary care hospitals. The **mean age** of participants was **57.4 years**, with a nearly balanced gender distribution (**86 males**, **114 females**). Of the total, **94 patients (47%)** reported using at least one form of herbal or traditional remedy concurrently with prescribed medications during their hospital stay.

Table 1: Table 1: Hospital Patient Data Summary

Variable	Value
Total patients interviewed	200
Mean age (years)	57.4
Gender (Male/Female)	86 / 114

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Variable	Value
Patients using herbal remedies (%)	94 (47%)
Patients with polypharmacy (≥5 drugs) (%)	128 (64%)
Reported adverse effects possibly linked to HDIs (%)	62 (31%)
Commonly used herbs (Top 3)	Ginger, Ginkgo, St. John's Wort
Most reported symptoms (Top 3)	Dizziness, Bleeding, Fatigue

Nearly half of the patients reported using herbal remedies alongside prescription medications. A high percentage of polypharmacy (≥5 concurrent drugs) was observed, and nearly one-third of these patients reported adverse effects that may be attributed to herb-drug interactions. The most frequently used herbs were ginger, ginkgo, and St. John's wort, and common symptoms included dizziness, bleeding, and fatigue

Table 2: Clinician Survey Summary

Survey Question	Yes (n=50)	No/Unsure (n=50)
Received formal training on HDIs	19 (38%)	31 (62%)
Routinely ask patients about herbal use	22 (44%)	28 (56%)
Aware of potential for serious HDIs	39 (78%)	11 (22%)
Believe HDIs are underreported	41 (82%)	9 (18%)
Use resources to check for HDIs	16 (32%)	34 (68%)

presents the results of a clinician awareness survey involving 50 healthcare professionals. While a majority acknowledged that herb-drug interactions (HDIs) can lead to serious outcomes, only a small fraction had received formal training or consistently asked patients about herbal medicine use. Most did not use resources or tools to verify possible HDIs.

Description of Results

A total of **200 adult inpatients** participated in the study, with a **mean age of 57.4 years** and a **gender distribution of 86 males and 114 females**. Nearly half (**47%**) of the patients admitted to using herbal or traditional medicines alongside their prescribed drugs during hospitalization. Herbal use was more prevalent among females and older adults, particularly those being treated for chronic conditions such as hypertension and diabetes.

Among these herbal users, **31% (n=62)** reported experiencing symptoms potentially associated with herb-drug interactions (HDIs). The most commonly reported adverse effects were **dizziness**, **fatigue**, and **increased bleeding tendencies**, especially in patients on anticoagulants or antihypertensive therapy. These findings align with existing literature suggesting that herbal compounds may intensify or diminish the pharmacologic effects of drugs through enzymatic modulation or additive effects (Jiang et al., 2020; Fasinu et al., 2018).

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The three most commonly consumed herbs were **ginger**, **ginkgo biloba**, and **St. John's wort**. For example, St. John's wort is known to induce cytochrome P450 enzymes, thereby reducing the efficacy of antidepressants and oral contraceptives. Similarly, ginkgo has been associated with increased bleeding risk when used in combination with aspirin or clopidogrel, a pattern noted in our study where multiple patients reported easy bruising and mucosal bleeding (Markowitz et al., 2018).Regarding medication burden, **64% of patients (n=128)** were receiving five or more prescription drugs—a condition known as polypharmacy, which significantly increases the risk of HDIs. Notably, patients under polypharmacy were twice as likely to report symptoms suggestive of interactions compared to those on simpler regimens.

From the **clinician survey**, only **38%** of respondents had received formal training on herbal-drug interactions. Although **78%** acknowledged the potential seriousness of HDIs and **82%** believed such interactions are underreported, less than half routinely asked patients about herbal use. Additionally, only **32%** used any form of database or tool to verify interactions before prescribing medications. These gaps in routine screening and formal training underscore the systemic barriers to safe integrative care and pharmacovigilance.

In summary, the data underscore a concerning mismatch between high rates of herbal medicine use and low clinical oversight, both from patients (non-disclosure) and healthcare providers (under-screening). The findings emphasize the need for standardized screening protocols, provider training, and patient education to reduce preventable harm from HDIs in clinical practice.

Discussion: This study reveals a significant and underrecognized clinical concern—the co-use of herbal remedies and prescription drugs by nearly half of hospitalized patients, with almost one-third reporting symptoms suggestive of herb-drug interactions (HDIs). Despite increasing global awareness, HDIs remain poorly tracked, underreported, and insufficiently addressed in daily hospital practice (1,2).One of the most concerning findings is the low disclosure rate by patients regarding herbal use. Only 18% of those using herbal remedies informed their healthcare providers. This pattern is consistent with global literature, which cites reasons such as patient belief that herbal remedies are natural and therefore harmless, cultural familiarity, and mistrust of pharmaceutical options (3,4). However, this assumption of safety is medically flawed, as many herbal products contain bioactive compounds capable of altering drug pharmacokinetics and pharmacodynamics (5).

Our data highlight the clinical impact of these interactions. Patients using ginkgo biloba**,** ginger**, or** St. John's wort reported symptoms such as bleeding, fatigue, and dizziness—effects that have been widely associated with these herbs when taken with anticoagulants, antidepressants, or antihypertensives (6,7). St. John's wort, for instance, induces cytochrome P450 enzymes, reducing plasma drug levels of many medications including SSRIs and oral contraceptives (8). Similarly, ginkgo may enhance the antiplatelet effect of aspirin, increasing bleeding risk (9). These effects are not hypothetical; they were reflected in our patient data.

Polypharmacy**,** present in 64% of the cohort, significantly amplifies the risk of HDIs. More medications mean more metabolic pathways are involved—and more opportunities for interference. Similar patterns were reported by Pires et al. (2020), who observed that older patients on multiple medications were more susceptible to HDI-related adverse outcomes

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(10). This highlights the importance of active screening for herbal use in polypharmacy cases.Despite awareness among clinicians—78% recognized the risk of serious HDIs—routine screening for herbal use was limited**.** Only 44% of surveyed healthcare providers asked patients about herbal product use, and fewer than a third used tools or resources to check for interactions. These results reflect systemic issues, including insufficient training, time constraints, and lack of institutional protocols for herbal use documentation (11,12).

Addressing HDIs requires a multi-level response. On the patient side, there is a clear need for **education campaigns** to challenge assumptions about the safety of herbal remedies. On the provider side, structured **training programs** and **clinical decision support tools** can help bridge the gap between knowledge and practice. At the system level, hospitals should integrate HDI screening into electronic health records and standard patient history forms (13,14).In conclusion, this study emphasizes that HDIs are not rare exceptions but common, preventable risks in contemporary clinical settings. Without proactive steps in surveillance, education, and practice reform, patient safety will remain compromised.

Conclusion

The findings of this study underscore a critical gap in patient safety arising from the widespread yet underreported use of herbal remedies alongside prescription medications. Nearly half of the hospitalized patients surveyed used traditional medicines concurrently with conventional drugs, while a substantial proportion experienced symptoms indicative of potential herb-drug interactions (HDIs). These findings are particularly concerning given that most patients did not disclose herbal use to their physicians, and the majority of healthcare providers lacked structured training or tools to systematically identify HDI risks.

The most commonly observed adverse effects—bleeding, dizziness, and fatigue—aligned with well-documented pharmacodynamic and pharmacokinetic interactions involving herbs like ginkgo, ginger, and St. John’s wort. Polypharmacy further intensified these risks, demonstrating the urgent need for clinical vigilance in high-risk patients, particularly those on anticoagulants, antidepressants, or antihypertensives.

This study highlights the importance of integrating HDI screening into clinical workflows through updated patient intake protocols, provider training modules, and the use of interaction-checking tools. Additionally, public education efforts are essential to dispel myths about the safety of herbal products and encourage honest communication between patients and healthcare teams.

In summary, herbal-drug interactions represent a hidden but actionable threat in contemporary clinical care. Mitigating this risk will require a combination of patient awareness, clinician preparedness, and institutional policy reform. Without timely interventions, the growing trend of self-directed herbal use may continue to undermine the effectiveness and safety of essential pharmacotherapies.

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