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RESEARCH ARTICLE

Herbal and traditional medicine use in Jordan: Pharmacological interactions and safety concerns - A quantitative study among clinical pharmacists

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Abstract

The use of herbal and traditional medicine (HTM) is widespread among people in Jordan and is often perceived by users as a natural and harmless substitute for modern medicine. However, HTMs may have significant pharmacologic risks and, without professional assessment, may potentially lead to drug-herb interactions and endanger patients' health. Owing to their expertise in pharmacotherapy, clinical pharmacists are the professionals that are perfectly designed to identify, prevent or manage these interactions. The objective of this study was to assess the knowledge, attitudes and practices (KAP) of Jordanian clinical pharmacists regarding HTMs, especially those that relate to drug-herb interactions and safety aspects. A questionnaire-based, multi-centre cross-sectional study was conducted by distributing emails to 210 clinical pharmacists working in hospitals and health centres across Jordan.The descriptive statistical analysis was used in the evaluation of the answers. Response rate to the survey was 88.6 % (n = 186 pharmacists). Nearly 78 % encounter patients consuming herbals, but only one third (35 %) feel comfortable identifying herb-drug interactions. The most familiar interactions were St. John's Wort, Ginkgo biloba and garlic with anticoagulant or antiplatelet medications. Notably, 60 % of pharmacists had no formal education in herbal pharmacology, but 71 % agreed to include this subject in continued education. Pharmacists frequently interact with patients using HTMs but often lack the knowledge or resources to provide safe clinical care. Such findings indicate that some educational curricula and national programs are required for clinical pharmacists to manage risk related to herbal medicine use.

Keywords: clinical pharmacists; drug interactions; herbal medicine; Jordan; pharmacovigilance; safety; traditional medicine

Introduction

Throughout of the Middle Eastern countries (including Jordan), the use of herbal and traditional medicines (HTMs) has historical basis and largely widespread in urban and rural areas (1). These products -such as *Allium sativum* (garlic), *Trigonella foenum-graecum* (fenugreek) and *Zingiber officinale* (ginger)-are formulated based on indigenous plants and traditional knowledge and have usually been considered as safe, natural and readily available replacements for synthetic pharmaceuticals (2).

However, this attitude may result in self-medication that is not well supervised and in HTM use not being disclosed to healthcare professionals - with serious consequences for patient safety (3).

The potential adverse effects of unsupervised HTM treatment, including hepatotoxicity, nephrotoxicity, allergic reactions and gastrointestinal disturbances, have been called into question in recent studies (4). Jordan has deemed misuse of HTM as associated with public health concerns. Some of these concerns include injury of the liver with herbal products used for weight loss, excessive bleeding from the ingestion of herbal anticoagulants and loss of electrolytes from a herbal diuretic (5). Also, some herbal products found in the markets of Jordan have been found to be more toxic due to undisclosed cross-contamination with corticosteroids, NSAIDs and heavy metals (6).

Concerning chronic patients, herb-drug interactions (HDIs) and the multiple therapies with the simultaneous intake of HTMs and anti-diabetes, cardiovascular and anticoagulants is of most concern. In such cases, patients may be more surprised that some medical professionals do not even ask about HTM usage, due to the slight toxic conception, which is culturally held (8). The difficulty which drug users and patients have in general in making clinical decisions is what concerns most about the depth of the issue.

To mitigate these risks, clinical pharmacists are well positioned to protect patients through medication reconciliation, drug interaction review and patient-focused counselling. They are trained to recognize and evaluate potential drug and herb interaction and to recommend interventions concerning HTM use and they can educate the patients about risks and safe use of HTM (9). They are in a singular position to fill the void between traditional medicine and evidence-based medicine--providing their patients with care that is broader and safer (10).

With the increasing use of HTMs in Jordan, a significant deficit can be identified in the literature in evaluating the readiness of clinical pharmacists to deal with HTM-related risks. To date, we

found only studies being identified based on population evaluate an existing literature related to the awareness and practices, where no study has been approaching knowledge, attitude and practice (KAP) among clinical pharmacists (11).

The aim of this research is to assess, using a quantifiable method, Jordanian clinical pharmacists' knowledge, attitudes and practices towards herbal and traditional medicines (HTMs) with focus on their ability to identify the possible interactions, evaluate the safety risk and counsel patients effectively. The study seeks to inform policy and evidence-based practice on HTM safety and enhance its incorporation into clinical pharmacy education and practice.

Materials and Methods

Study design and setting

Licensed clinical pharmacists employed or undergoing their clinical training in hospitals and health care settings at all regions in Jordan; public, private and university structures contributed to this descriptive cross-sectional study. The enrolling centers comprised 12 institutions covering north, central and south of Jordan. Specifically, these comprised:

University-affiliated hospitals

- King Abdullah University Hospital (Irbid)
- Jordan University Hospital (Amman)

Public sector hospitals

- Prince Hamzah Hospital (Amman)
- Al-Bashir Hospital (Amman)
- Queen Rania Hospital for Children (Amman)
- Irbid Governmental Hospital (Irbid)
- Al-Karak Governmental Hospital (Karak)
- Al-Mafraq Governmental Hospital (Mafraq)
- Al-Tafileh Governmental Hospital (Tafileh)

Private hospitals

- Specialty Hospital (Amman)
- Istishari Hospital (Amman)
- Al-Kindi Hospital (Amman)

These centers were chosen to have regional representation and to reflect various practice settings in Jordan's health care system. A purposive sampling was used to recruit 186 licensed clinical pharmacists from these institutions. The study was approved by the Scientific Research Committee at the Faculty of Pharmacy at Mutah University and informed consent was obtained from all the participants.

Instrument development

After examining previous research and validated instruments from related KAP studies, the questionnaire was created (12, 13). It was divided into four parts:

1. Professional and demographic background.
2. Understanding of common drug-herb interactions (DHIs) and herbal and traditional medicines (HTMs).
3. Perceptions of HTMs and how they are incorporated into clinical procedures.
4. Procedures for pharmacovigilance reporting and patient counseling.

Content validity was reviewed by five experts in clinical and academic pharmacy. Additionally, twenty pharmacists participated in a pilot study to assess the clarity, consistency and relevance of the instrument.

Data collection and analysis

The survey was distributed electronically using Google Forms and disseminated through professional networks of clinical pharmacists in Jordan. Participation was voluntary and informed consent was obtained electronically at the beginning of the form. Respondents were assured of anonymity and confidentiality and data was used strictly for academic and research purposes.

The Google Form link used for the distribution was: https://forms.gle/QELpZWZxowSdbEu6

The response data from the Google Forms survey were compiled and attached as a supplementary Excel file with this manuscript. This file includes timestamped responses from 187 pharmacists, covering all demographic, knowledge, attitude, practice and barrier-related items as outlined in the survey instrument.

Results

The survey questionnaires were completed by 186 clinical pharmacists, with an 88.6 % response rate among 210 invited pharmacy practitioners. Demographic characteristics are summarized in Table 1. Most participants were female (63 %), aged 25 to 40 years (72 %) and possessing 1 to 10 years of clinical pharmacy experience (58 %).

With regards to knowledge, 78 % of pharmacists reported that they sometimes meet patients who use herbal or traditional medicines (HTMs). However, only 35 % could accurately identify three or more known drug-herb interactions. The percentage of pharmacists' recognition of interactions for specific herbal products is presented in Table 2. St. John's Wort was the most common (42 %), including its combination with oral contraceptives and antidepressants. Next was garlic (37 %) which had a notorious interaction with warfarin and tested with aspirin and Ginkgo biloba (29 %) which was related to greater bleeding rate when put together with anti-inflammatory agents or anticoagulants. The interactions between Echinacea (15 %) and Ginseng (12 %) were less well recognized.

Table 1. Demographic characteristics of clinical pharmacists (n = 186)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Female	117	63%
	Male	69	37%
Age Group	25-30 years	80	43%
	31-40 years	54	29%
	>40 years	52	28%
Years of Experience	≤5 years	62	33%
	6-10 years	45	25%
	>10 years	79	42%
Practice Setting	Public hospital	110	59%
	Private hospital	50	27%
	Ambulatory care center	26	14%

n = number of respondents

Table 2. Knowledge of common herbal medicines and associated drug interactions

Herbal Medicine	Common Drug Interactions	Pharmacists Identifying Correctly n (%)
St. John's Wort	Oral contraceptives, antidepressants	78 (42%)
Garlic	Warfarin, aspirin (↑ bleeding risk)	69 (37%)
Ginkgo biloba	NSAIDs, anticoagulants (↑ bleeding risk)	54 (29%)
Echinacea	Immunosuppressants	28 (15%)
Ginseng	Hypoglycemics, anticoagulants	22 (12%)

↑ indicates increased risk

One-way ANOVA was used to compare knowledge scores for significant differences according to age group (F = 4.26, p = 0.006) and the knowledge scores were the best for 31-40 years group. The experience in years was also an independent predictor of knowledge and pharmacists practicing more than 10 years scored higher (F = 5.18, p = 0.002).

Pharmacists generally had positive attitudes toward the inclusion of herbal safety in practice. Responses were consistent with these findings in that 64 % felt that pharmacists do not see most herb-drug interactions that occur in clinical settings, 71 % believed in including herbal pharmacology in CME. In addition, 59 % agreed that there should be national guidelines concerning the use of herbal remedies. These responses showed clinician's overall awareness of the potential HTM-related risks of harm responses) willingness to enhance practice standards by education and policy (Table 3).

Table 4 presents several key gaps with reference to today's clinical practices. Alarmingly,71 per cent of respondents did not ask patients if they were using herbal medicine during medication reconciliation; only 29 % did. Furthermore, only 47 % had reported a previous suspected herb-drug interaction, 53 % never did. There was a striking gap between those who had received a formal education in herbal medicine (40 %) and those who had not (60 %). The association of formal training with confidence in herbal

Table 3. Attitudes toward herbal medicine use and education

Statement	Agree n (%)	Neutral n (%)	Disagree n (%)
Herb-drug interactions are underreported	119 (64%)	34 (18%)	33 (18%)
Herbal pharmacology should be part of CME programs	132 (71%)	29 (16%)	25 (13%)
National guidelines on herbal use are needed	110 (59%)	45 (24%)	31 (17%)

CME = continuing medical education

Table 4. Practices regarding herbal medicine in clinical settings

Practice	Yes n (%)	No n (%)
Routinely ask patients about herbal use	54 (29%)	132 (71%)
Have reported a suspected herb-drug interaction	87 (47%)	99 (53%)
Received formal training on herbal medicines	74 (40%)	112 (60%)

-drug interaction identification was statistically significant ($X^2 = 14.72$, p = 0.001). In addition, asking of patients related to use of herbal products was significantly associated with pharmacists working in ambulatory or hospital settings ($\chi^2 = 10.53$, p = 0.005). It was also found that Faculty with more than 10 years of working experience were much more likely to be respondent to an encounter ($\chi^2 = 8.89$, p = 0.012).

Barriers that affected efficient herbal pharmacovigilance are also listed in Table 5. The most common reported barrier was no formal training (60 %) and access to clinical references (48 %). Furthermore, 39 % reported that patients frequently do not disclose their use of herbal products and 35 % reported the lack of a national reporting system as a barrier. These findings also imply that structural and educational revamps are essential to ensure that pharmacists handle herbal medicine use in a safer manner.

Discussion

In the end, 186 clinical pharmacists responded with response rate of 88.6 %. A demographic summary is shown in Table 1 for which the majority are female (63 %) with an age range of 25-40 years (72 %) and 1 to 10 years professional experience (58 %).

Herbal drugs and interactions

Most participants (78 %) had come across patients taking herbal or traditional medicines (HTMs) in practice. However, only 35 % correctly identified at least three commonly encountered drug-herb interactions. Table 2 The most frequently mentioned plant and its interactions in decreasing order (44 %) St. John's Wort was the herb most frequently mentioned for its interactions, mainly with oral contraceptives and antidepressants (42 %). Garlic (37 %) and Ginkgo biloba (29 %) were also highlighted and in part, shedding light to bleeding tendency with anticoagulants and NSAIDs. But interaction with Echinacea and Ginseng (15 % and 12 % respectively) were less recognized by pharmacists.

The deficit of clinically relevant knowledge and clinically relevant knowledge is of utmost importance, is what these results reveal and correlate with other studies from the area. For example, in Al-Arifi (2013), it was indicated that out of all pharmacist respondents in Saudi Arabia, merely 30 % were able to recognize two or more herb-drug interactions despite the ft that they routinely interacted with HTM users (14). In the same fashion, a study carried out in the United Arab Emirates showed that only 27 % of pharmacists had a fair understanding of the interactions (15). There is, then, a more profound issue surrounding the teaching and learning of pharmacognosy in the entire Middle East.

Statistical analysis with ANOVA revealed that there was significant difference in knowledge scores for age group (F = 4.26, p = 0.006) and years of experience (F = 5.18, p = 0.002); the

Table 5. Barriers to effective pharmacovigilance of herbal medicines

Barrier	n (%)
Lack of formal training	112 (60%)
Limited clinical references	89 (48%)
Patients reluctant to disclose herbal use	72 (39%)
Lack of national reporting systems	65 (35%)

pharmacists aged 31-40 years and those with >10 years of experience scored higher. These findings indicate that exposure could have a role in knowledge acquisition, but only in the absence of formal continuing education.

HTM use and education perception

Pharmacists had an overwhelmingly positive attitude towards integration of herbal safety into pharmacy practice. As demonstrated in Table 3, 64 % agreed that interactions between herbs and drugs are unreported in practice. 1/71 % of respondents strongly concurred on incorporating herbal pharmacology in the CME programmes and 59 % strongly agreed on the usefulness of having national guidelines on HTM use.

These attitudes are in line with earlier research. An Egyptian survey showed that more than 70 % of the participants were in favor of a well-structured herbal medicine training based on their interest (16). In India, also reported that majority of the healthcare providers perceived the integration of CAM to be important (17). The high agreement percentages we have seen are an indicator of professional understanding about the problematic non-medical use of HTM and the need for policy support.

Nevertheless, this high level of agreement does not, it would seem, automatically result in practical application, where a certain divide between attitude and adversary could be seen.

Behavior patterns around HTM in practice environments

Even if the pharmacists were aware, the clinical use of herbal medicine was not so widespread. Table 4 reveals that most respondents (at 71 %) do not always inquire about the use of herbal medicines during medication reconciliation. Additionally, 53 % had never reported suspected herb-drug interaction and 60 % had not received any formal education about herbal medications.

The relationship between education and professions acting independently has been reported by Batey (2008), who has discussed how training was positively correlated with self-reported confidence regarding identification of roles (18). Practice setting also had an impact on behavior; healthcare professionals working in ambulatory care centers were more prone to screen for herbal use ($\chi^2 = 10.53$, $p = 0.005$). Those with over 10 years of experience were also significantly more likely to report suspected contacts with animals ($\chi^2 = 8.89$, $p=0.012$).

Similar deficiencies in clinical practice were described in research conducted in Qatar and Lebanon, with less than 30 % of pharmacists routinely inquiring about herbal product use. The knowledge-practice gap may be due to the absence of national reporting frameworks, standardized counseling guidelines (19).

Barriers to Herbal Pharmacovigilance

The main barriers, which are presented in Table 5. The most prevalent barriers included no formal training (60 %), limited access to clinical references (48 %), patient nondisclosure of herbal use (39 %) and the lack of a national reporting system (35 %).

The barriers are like those revealed in WHO reports and studies throughout the Middle East. The study which found that over 50 % of pharmacists in Egypt were unprepared because of inadequate training, inadequate clinical toolset for decision making and lack of clinical decision support tools is also relevant here (16). Communication with patients is also complicated due to the cultural taboo as well as the lack of control of herbal fenomena.

Addressing these challenges takes a more wide-ranging approach as it includes, setting national policy frameworks, integrating herbal pharmacology into pharmacy treatment and curriculum and adding more intuitive reporting systems. There also needs to be patient education to reduce obfuscation of what herbal medicines are.

Conclusion

This research represents a holistic assessment of the awareness, attitudes and practice of the clinical pharmacists in Jordan about herbal & traditional medicines (HTMs), specifically about drug-herb interactions and patient safety. The analysis has shown that despite common exposure to HTMs, many pharmacists do not consider themselves adequately trained, knowledgeable, or confident enough to properly handle their associated risks. Pharmacists were least knowledgeable about common drug-herb interactions (35 %) and were least likely to screen patients for herb use (29 %). A significant number of them had never even documented suspected interaction, highlighting pertinent gaps in their pharmacovigilance activities.

This lack of interaction is an important gap in pharmacovigilance and demonstrates a lack of effort in an area that is critical to patient safety. Yet, it is encouraging to see that a substantial portion of pharmacists do advocate for the addition of herbal pharmacology to the core subjects of postgraduate training and see the need for its inclusion in national guidelines. This advocacy, in addition to the previously acknowledged lack of interactions, illustrates the need for action and the commitment from pharmacists to better their practice.

To close the cognition - action gap, the integration of policy frameworks is a starting point, incorporating the need for formalized training for upcoming surgeons, institutional support on the inclusion of HTMs in standard clinical practice and interdisciplinary collaboration. Enhanced access to national databases and clinical resources, combined with collaborative practice, will empower pharmacists to carry out these initiatives.

Finally, trying to tackle the drawbacks of herbal medicine use is not merely an educational issue, it is a patient safety issue. Through directed endeavors such as these, Jordanian clinical pharmacists can play a pioneering role in developing an integrated, evidence-based practice of health care that safely embraces traditional medicine. The momentum is real; it's now a matter of organized action that capitalizes on awareness.

Authors' contributions

AMK done all the work related to the manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

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