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Original article

Knowledge, Attitudes, and Practices of Community Pharmacists toward Herbal–Drug Interaction: A Cross-Sectional Study in Libya

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ABSTRACT

The use of herbal medicines has increased globally, leading to a higher risk of herbal–drug interactions, particularly when patients take herbal products alongside conventional medicines. Community pharmacists play a crucial role in ensuring the safe use of herbal products; however, limited data are available concerning the pharmacists' knowledge of herbal –drug interactions in Libya. This study aimed to assess the knowledge, practices, and attitudes of community pharmacists regarding herbal medicines and herbal–drug interactions, focusing on Ashwagandha, *Ginkgo biloba*, curcumin, and echinacea in Libyan cities (Tripoli, Benghazi, and Al-Khums) and a small number from Canada and Germany. A cross-sectional descriptive study was conducted between May and October 2025 among 191 community pharmacists working in Libya, Canada, and Germany. Data were collected using a structured, self-administered questionnaire. Data were analyzed using SPSS version 27. Most pharmacists were from Libya (87.4%), with limited participation from Canada and Germany. Overall knowledge of herbal medicines and general awareness of herbal–drug interactions were rated as good. However, actual knowledge of targeted herbal medicines–drug interactions was low, particularly for echinacea. Higher educational level, longer professional experience, and city of practice were significantly associated with better knowledge of herbal medicines–drug interactions. Attitudes toward herbal medicines were mostly positive. Community pharmacists demonstrated acceptable general knowledge and positive attitudes toward herbal medicines; however, their actual knowledge of related herbal medicines–drug interactions was notably insufficient and low. These findings highlight the need for targeted educational programs and the development of national guidelines.

Introduction

The worldwide use of complementary and alternative medicine, especially herbal therapies, has increased. Herbal medicines have been used for over 5000 years, and they are one of the most common sources of medicines [1]. Ashwagandha (Winter Cherry), also known as *Withania somnifera* (L.)**,** belongs to the family Solanaceae. Ashwagandha is used in botanical medicines for immunomodulation, antioxidant, and cancer treatment, including breast and renal cancer [2]. The biologically active chemical components of *Withania somnifera* include steroidal lactones (withanolides, withaferins), alkaloids, saponins, amino acids, acylsteryl glucosides, Sitoindosides, and volatile oil [2]. *Ginkgo biloba* L. from the Ginkgoaceae family has antioxidant effects, antibacterial activity, hypolipidemic activity, platelet-activating factor antagonist activity, and helps in reducing the rate of cognitive decline in individuals with dementia and alzheimer's disease, treating vertigo and tinnitus [1].

The major active components of *Ginkgo biloba* are Ginkgolide A, Ginkgolide B, Ginkgolide C, polyphenols, terpenoids, flavonoids (quercitrin, kaempferol, and rutin), bioflavonoids, organic acids, ascorbic acid, iron, bilobalide, ginkgolides, and other vitamins [1]. Turmeric (*Curcuma longa* L.) is a perennial herb of the family Zingiberaceae. It is a medicinal plant widely used as a home remedy for various illnesses and consumed as a coloring food, spice, and food preservative [3]. The major phytoconstituent in turmeric rhizomes is curcumin (diferuloylmethane), comprising 60-70% of raw curcuma. which is responsible for the yellow color of turmeric, other components include carbohydrates, fats, proteins, and essential oils [4]. Echinacea is a medicinal plant of the Asteraceae family. Echinacea possesses anti-microbial and antioxidant activity, and is utilized as a natural source to prevent the infection of the flu, cold, toothache, tooth abscess, and cancer prevention [5]. The interaction between herbal medicine and drugs is important, particularly for drugs with a narrow therapeutic index as digoxin and warfarin. The pharmacodynamics (antagonize or exacerbate the drug's effects) or pharmacokinetics (which affect a drug's concentration in the blood and pharmacologic action, alterations in the absorption, metabolism, distribution, and excretion of drugs) might be influenced by the use of herbal treatments, potentially leading to treatment failure or serious and life-threatening adverse reactions [6].

Herbal-drug interactions are possibly more common than drug-drug interactions and are very probable to be significantly underreported; more clinical research is needed to study how drugs interact with herbs [7].

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Many studies suggest that ashwagandha increases thyroid hormone levels. Therefore, it should be monitored closely and advise the patients if used with thyroid hormone medications such as levothyroxine or others to prevent the development of symptoms of thyrotoxicosis [8]. The efficacy of immunosuppressants is reduced when given with ashwagandha. Products containing ashwagandha have been reported to cause liver injury in rare cases, and taking it with other medications that can also affect the liver, such as valproic acid, may increase that risk [9]. *Ginkgo biloba* is known to inhibit platelet aggregation; therefore, when combined with antiplatelet medications such as aspirin or anti-coagulant medications, such as warfarin, patients should be closely monitored due to increased bleeding risk [10].

Ginkgo biloba is a possible cause of postoperative bleeding. Some case studies have suggested that patients taking non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen or naproxen at recommended doses experienced gastrointestinal bleeding after self-prescribing ginkgo [11].

Many case reports also demonstrate that ginkgo may cause fatal seizures in patients taking antiepileptic medications such as phenytoin or valproate. A possible mechanism is the induction of many types of cytochromes P450 isoenzyme like CYP2C19. Phenytoin and valproate are substrates of CYP2C19, and therefore, ginkgo may increase the metabolism of phenytoin and valproic acids, thereby reducing their levels [8]. Many studies show that curcumin is a moderate inhibitor of CYP1A2, CYP2C19, CYP2D6, and CYP3A4. The serum concentrations and side effects of medications that are extensively metabolized by these enzymes may be increased [12]. Carbamazepine is metabolized by CYP isoenzymes in the liver, mainly CYP3A4, in addition to other CYP isoenzymes such as CYP2B6, CYP2C8, and CYP3A5 [12. Many studies stated that when combining carbamazepine with curcumin-containing products, the doctor must monitor this combination closely, due to Significant interaction that can occur; curcumin will increase the level or effect of carbamazepine (Pharmacokinetic interactions) [12]. Tacrolimus is an immunosuppressant drug. Tacrolimus is also metabolized by hepatic CYP3A4. Concomitant use of curcumin with this drug may affect its metabolism and thereby increase the blood levels as well as the risk and severity of adverse effects [13]. Some research stated that alkylamides phytoconstituent found in echinacea, can inhibit the human cytochrome P450 enzyme activity. *E. purpurea* root, if taken as 1600 mg/day for 8 days, can decrease the oral clearance of CYP1A2 substrates, such as duloxetine [11].

Depending on the duration of echinacea treatment, it can cause changes in hepatic and intestinal CYP3A, CYP3A4, and CYP1A2 substrate drug metabolism [14]. An in vitro study shows that CYP2C9 and CYP3A4 are the main cytochrome P450s in montelukast metabolism [15]. Paracetamol is primarily metabolized in the liver; therefore, concomitant use of echinacea with paracetamol and montelukast needs more frequent monitoring by a doctor because echinacea may increase the blood levels and the effects of paracetamol and montelukast [16]. Barbiturates (a class of central nervous system (CNS) depressants), which are metabolized by the hepatic cytochrome p450 enzymes, should be avoided, as such a combination can precipitate toxicity of these drugs [17]. This study aimed to evaluate community pharmacists' attitudes and practices toward herbal medicine and to assess their knowledge related to herbal medicine-drug interactions in Libyan cities (Tripoli, Benghazi, and Al-Khums), Canada, and Germany. Among these medicinal therapies are ashwagandha, curcumin, *ginkgo biloba,* and echinacea.

Methods

Study design

A cross-sectional descriptive study was conducted between May 2025 and October 2025 in the community pharmacies. The ethical approval was taken from Attahadi University. Convenience sampling was used for the selection of pharmacists from three main cities in Libya: Tripoli, Al-khums, and Benghazi. In addition to Canada (Toronto and Alberta cities) and Germany (Zwickau city), outside of Libya.

Study Tool

The questionnaire was based on previously published studies and reviewed by the supervisor and one specialist pharmacist. It consisted of four main domains (demographics, pharmacist attitudes, knowledge related to herbal medicines therapeutic use and practice, knowledge related to herbal medicines- drug interactions).

Study Population

The study targets licensed community pharmacists working in Canada, Germany, and Libya. A total of 191 pharmacists were included. The following inclusion criteria were used: Pharmacists with an official pharmacy qualification who are working at community pharmacies. The exclusion criteria were: Hospital pharmacists, any other healthcare professional other than community pharmacists, or pharmacists who refused to take part in the survey.

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Data Management and Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 27. Descriptive statistics, such as frequency and percent, were obtained. 4-Point, 5-Point, and 6-Point Likert Scales were used for some responses. An ANOVA test was used to find the correlation between many variables. A p-value of less than 0.05 represents a significant difference.

Results and discussion

Demographic data

The data showed that most pharmacists were from Libya (87.4%), with a smaller proportion from Canada (10.9 %) and a negligible representation from Germany (1%). The relatively low participation from Germany (Zwickau city) and Canada (Toronto and Alberta cities) suggests limited representation from these settings (Table 1). Among Libyan respondents, more than half were pharmacists from Tripoli (54.5%), followed by Al-Khums (28.8%). Benghazi represented only 4.7%. The dominance of Tripoli suggests that easier access to pharmacists, as Tripoli is the capital city of Libya, and contains the highest concentration of community pharmacies. Most participants were young to middle-aged, 42.9% were between 20 and 30 years, and 36.1% were aged 31–40. Only 20.9% were older than 40 years. This indicates that most respondents belong to the early-to-mid career stages, which may correlate with more recent exposure to updated pharmaceutical education and training, possibly influencing their knowledge of herbal medicines.

The gender distribution illustrates that females represent 51.8% and males 48.2%. This balance enhances the generalizability of perceptions and attitudes across genders, suggesting no gender bias in sample distribution. Most respondents had less than 10 years of experience (68.6%), while only 14.1% had more than 16 years of practice. This indicates that early and mid-career pharmacists constitute the majority of the sample. These results are consistent with other studies that were done in Riyadh, Saudi Arabia (2010), in which the mean age of participant pharmacists was 33 years old, with a median duration of 7 years in practice, but the proportion of females was only 24% [18**].**

Table 1. Demographic data for participating pharmacists

Item	Number	Percent (%)
Country of practice		
Libya	167	87.4
Canada	21	10.9
Germany	2	1.0
Geographic Distribution of Libyan Respondents (Cities of Practice)		
Tripoli	104	54.5
Al-khums	55	28.8
Benghazi	9	4.7
Age Group Distribution of Respondents		
20-30 years	82	42.9
31-40 years	69	36.1
41-50 years	21	11.0
Older than 50 years	19	9.9
Gender Distribution of Pharmacists		
Male	92	48.2
Female	99	51.8
Years of Professional Experience Among Respondents		
1-5 years	76	39.8
6-10 years	55	28.8
11-15 years	33	17.3
More than 16 years	27	14.1
Educational Qualifications of Respondents		
Diploma	47	24.6
Bachelor degree	95	49.7
Master degree	20	10.5
Ph.D.	29	15.2
Attendance of Training in Alternative Medicine, Pharmacognosy, or Phytochemistry		
Yes	106	55.5
No	85	44.5

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Almost half of the respondents held a bachelor's degree (49.7%), while diploma holders represented 24.6%. Master's and PhD holders made up 10.5% and 15.2%, respectively. This distribution indicates a well-educated sample with diverse academic backgrounds, allowing for variations in herbal medicine knowledge depending on their level of training. Tripoli city shows bachelor's degree as the highest level, followed by a diploma, while Al-khums shows a bachelor's degree as the highest level, followed by Master's and PhD (Figure 1). The findings of the present study are partially consistent with those reported in Palestine in 2022, where most pharmacists possessed a bachelor's degree (94%) in pharmacy, and the remaining had a higher pharmacy degree [OBJ]19. More than half of the respondents (55.5%) reported having attended training courses related to herbal or natural medicine fields. This suggests a relatively good level of professional engagement with herbal medicine education, which may positively influence their knowledge and practices regarding herbal–drug interactions. The pharmacists located in Tripoli have attended an alternative therapy course more than those in Al-khums and Benghazi cities.

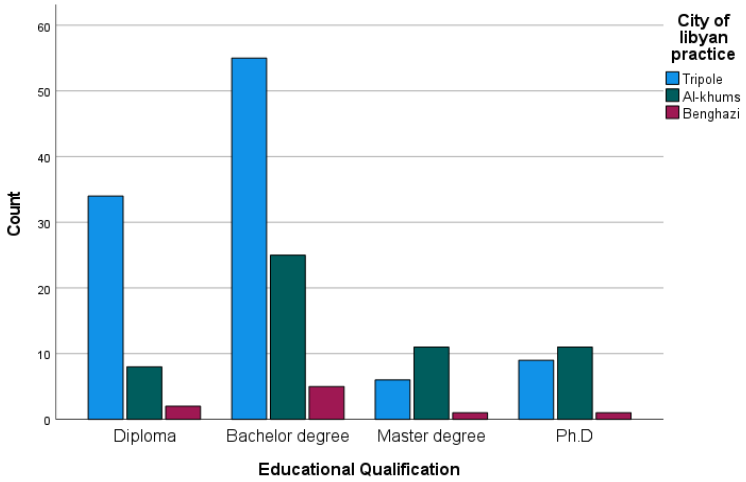

Figure 1. The relationship between the cities of Libya and the educational level

Knowledge of herbal medicines (4-Point Likert Scale)

Weighted averages for most items in Table 2 fall within the "Good" range (2.51–3.25), indicating a generally adequate knowledge level regarding herbal medicines, herbal–drug interactions, side effects, and precautions. Overall, pharmacists demonstrate satisfactory but improvable knowledge when they self-rate their knowledge about herbal medicine in general. (Figure 2) shows that most dispensed herbal medicines in community pharmacies among Libyan cities were ashwagandha products, followed by *Ginkgo biloba*, and the least were echinacea products. The number of pharmacists included in this study outside of Libya (Canada and Germany) was very small and not representative for comparison with those inside Libya. However, the initial analysis displays the same results, with ashwagandha products being the highest dispensed herbal medicine. In Saudi Arabia, Riyadh studies show that the ginkgo supply was 23% of common dispended herbal products [18].

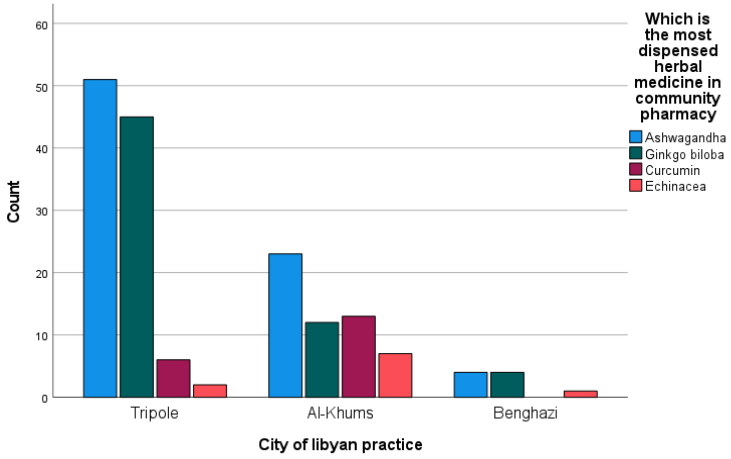

Figure 2. The most dispensed herbal medicine in community pharmacy

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Table 2. Knowledge of pharmacists about herbal medicines (4-Point Likert Scale)

Item		Bad	Acceptable	Good	Very good	Weight average	Responding
Your level of knowledge about herbal medicines	N	18.00	47.00	71.00	55.00	2.85	Good
	%	9.40	24.60	37.20	28.80		
Your knowledge about herbal drug interactions	N	13.00	71.00	78.00	29.00	2.64	Good
	%	6.80	37.20	40.80	15.20		
Level of awareness regarding the side effects of herbal medicines	N	18.00	70.00	72.00	31.00	2.61	Good
	%	9.40	36.60	37.70	16.20		
Your knowledge about precautions related to herbal medicines	N	28.00	62.00	65.00	36.00	2.57	Good
	%	14.70	32.50	34.00	18.80		
	%	45.00	35.60	12.00	7.30		

Practice and attitudes toward herbal medicines

Table 3 illustrates pharmacists' self-rated practices and attitudes toward general herbal medicine. The findings show that all weighted averages fall within the "Sometimes" category (2.51–3.25), indicating a moderate level of practice and attitude toward herbal medicine. A high percentage of respondents sometimes use herbal medicines for self-treatment and dispense them in the pharmacy. While practices are not infrequent, they are not performed consistently. This suggests that pharmacists recognize the importance of herbal medicines but may face barriers, including a lack of confidence, limited training, or insufficient clinical guidelines. Similar to the study conducted in 2022 that aimed to evaluate the attitude and knowledge of community pharmacists towards herbal products in Palestine, which conclude, the participants in general supposed that their knowledge about herbal products, herbal drug side effects, herbal drug interactions, and herbal drug precautions was good, approximately 80% in United Arab Emirates (UAE) and More than half the pharmacists in Kuwait used herbal medicines for self-treatment, pharmacists in UAE and Saudi Arabia described dispensing herbal medicines in community pharmacies, 61% of pharmacists in the Palestine study thought that herbal medicine was safer and have fewer side effects than conventional medicines [19].

Table 3. Practice and attitudes toward herbal medicines (4- Point Likert Scale)

Item		Never	Rarely	Sometimes	Always	weighted average	Responding
Use herbal medicines for self-treatment	N	25.00	33.00	83.00	50.00	2.83	Sometimes
	%	13.10	17.30	43.50	26.20		
Dispense herbal medicines in the pharmacy	N	17.00	45.00	95.00	34.00	2.76	Sometimes
	%	8.90	23.60	49.70	17.80		
Counsel patients about their use of herbal medications when recommending other medicines	N	15.00	52.00	69.00	55.00	2.86	Sometimes
	%	7.85	27.23	36.13	28.80		
Agree that herbal medicines have fewer side effects than conventional medicines	N	18.00	45.00	64.00	63.00	2.89	Sometimes
	%	9.40	23.60	33.50	33.00		
Provide counselling to patients about the potential risks of interactions between herbal and conventional medicines	N	21.00	40.00	69.00	61.00	2.89	Sometimes
	%	11.00	20.90	36.10	31.90		

Knowledge of selected herbal medicines' uses

The weighted means of the 6-Point Likert Scale indicate that respondents generally reached the "1 correct" knowledge level for ashwagandha, *ginkgo biloba*, and curcumin uses. However, knowledge of echinacea uses was lower (incorrect). This demonstrates that pharmacists have a moderate but incomplete understanding of the therapeutic uses of the studied herbal medicines. Greater familiarity with commonly used herbs such as ashwagandha, curcumin, and ginkgo is expected, whereas limited knowledge of echinacea reflects unfamiliarity or lower usage in Libya and similar regions (Table 4).

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Table 4. Knowledge of selected herbal uses (6-Point Likert Scale)

Variables		Incorrect	1 correct answer	2 correct answers	3 correct answers	4 correct answers	I don't know	Weighted average	Responding
Ginkgo Biloba uses	N	0	127	31	7	6	20	2.9	1 correct
	%	0.0	66.5	16.2	3.7	3.1	10.5		
Ashwagandha uses	N	0	110	34	22	0	25	3.1	1 correct
	%	0.0	57.6	17.8	11.5	0.0	13.1		
Curcumin uses	N	0	110	44	9	9	19	3.2	1 correct
	%	0.0	57.6	23.0	4.7	4.7	9.9		
Echinacea uses	N	11	120	5	1	0	54	2.4	incorrect
	%	5.7	62.8	2.6	0.5	0.0	28.2		

Scoring: Incorrect = the pharmacists chose the incorrect answer regarding the selected herbal use, indicating poor knowledge. 1 correct = the pharmacist selected only one correct answer from different correct choices, which indicates limited knowledge about the selected herbal use. 2 correct = the pharmacist selected only 2 correct answers, which reflects partial knowledge. 3 correct = the pharmacists selected 3 correct answers, which indicates good knowledge. 4 correct = the pharmacists' answers are correct, which reflects comprehensive knowledge. I don't know- the pharmacists reported no knowledge about the correct answer (lack of knowledge)

Pharmacists' knowledge of selected herbal medicines–drug interactions

Respondents demonstrated low and poor knowledge regarding selected herbal medicines–drug interactions across all herbal products, despite general knowledge of herbal medicine. Most weighted averages fall within the "incorrect" to "I don't know" range, since the total knowledge of ashwagandha interactions falls within 1 correct. Ashwagandha showed relatively better interaction knowledge compared to the other herbs, possibly due to its longer history of use. Notably, the consistently low scores for others suggest that pharmacists lack comprehensive awareness of clinically significant herbal-drug interactions. This reinforces the need for structured educational programs focusing on herbal–drug safety**.** Self-rating of herbal medicine knowledge was good and differed from the actual ones. These findings are concordant with those reported from the Saudi Arabia study (2010), in which 80% of pharmacists stated they had good knowledge about herbal medicine. But the actual test revealed that about half of pharmacists did not know the correct indications for use of herbal medicines, more than half of the participants were unaware of herbal products' side effects and contraindications, and about 80% had problems with herbal-drug interactions. In addition to this study, the knowledge was lowest among new graduates who had taken related courses about herbal medicines during their undergraduate studies and weakened with time (18). Aba Hussain et al. A study in Kuwait stated that 31% of the pharmacists did not have enough information about interactions between herbs and conventional drugs, and K.M. Alkharfy's study in Saudi Arabia revealed that about 27% of community pharmacists had little or no knowledge about these interactions [18].

Table 5. Knowledge of selected herbal medicines–Drug Interactions (6-Point Likert Scale)

Variables		Incorrect	1 correct answer	2 correct answers	3 correct answers	4 correct answers	I don't know	Weighted average	Responding
Curcumin with Antiplatelet, Anticoagulant (e.g., Warfarin, Aspirin)	N	91	47	0	0	0	53	1.9	incorrect
	%	47.6	24.6	0.0	0.0	0.0	27.7		
Curcumin with Anticonvulsant (e.g., Carbamazepine)	N	109	25	0	0	0	57	1.8	I don't know
	%	57.1	13.1	0.0	0.0	0.0	29.8		
Curcumin With Immunosuppressants (e.g., Tacrolimus)	N	101	38	0	0	0	52	1.9	incorrect
	%	52.9	19.9	0.0	0.0	0.0	27.2		
Total Knowledge of curcumin interaction	N	71	41	25	3	0	51	2.2	incorrect
	%	37.2	21.5	31.1	1.6	0.0	26.7		
Ginkgo with Antiplatelet Anticoagulant (e.g., Warfarin, Aspirin)	N	110	35	0	0	0	46	1.9	incorrect
	%	57.6	18.3	0.0	0.0	0.0	24.1		
Ginkgo with	N	105	45	0	0	0	41		

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NSAIDs (e.g., Ibuprofen, Naproxen)	%	55.0	23.6	0.0	0.0	0.0	21.5	2.0	incorrect
Ginkgo with Proton pump inhibitors (e.g., Omeprazole)	N	106	40	0	0	0	45	1.9	incorrect
	%	55.5	20.9	0.0	0.0	0.0	23.6		
Ginkgo With Antiepileptic (e.g., Valproic acid)	N	98	35	0	0	0	58	1.8	I don't know
	%	51.3	18.3	0.0	0.0	0.0	30.4		
Ginkgo With Sedatives (e.g., Diazepam)	N	98	34	0	0	0	59	1.8	I don't know
	%	51.3	17.8	0.0	0.0	0.0	30.9		
Total knowledge of *Ginkgo biloba* interaction	N	46	64	23	10	12	36	2.6	incorrect
	%	24.1	33.5	12	5.2	6.3	18.8		
Ashwagandha with Antiepileptic (e.g., Valproic acid)	N	100	42	0	0	0	49	1.9	incorrect
	%	52.4	22.0	0.0	0.0	0.0	25.7		
Ashwagandha with Thyroid hormones (e.g., Levothyroxine)	N	93	51	0	0	0	47	2.0	incorrect
	%	48.7	26.7	0.0	0.0	0.0	24.6		
Ashwagandha With Immunosuppressants	N	104	41	0	0	0	46	1.9	incorrect
	%	54.5	21.5	0.0	0.0	0.0	24.1		
Total knowledge of ashwagandha interaction	N	66	45	23	13	0	44	2.8	1correct
	%	34.6	23.6	12	6.8	0.0	23		
Echinacea With Duloxetine	N	83	35	0	0	0	73	1.8	incorrect
	%	43.5	18.3	0.0	0.0	0.0	38.2		
Echinacea With Barbiturates	N	100	25	0	0	0	66	1.7	I don't know
	%	52.4	13.1	0.0	0.0	0.0	34.6		
Echinacea with paracetamol	N	95	38	0	0	0	58	1.8	incorrect
	%	49.7	19.9	0.0	0.0	0.0	30.4		
Echinacea with montelukast	N	89	36	0	0	0	66	1.8	incorrect
	%	46.6	18.8	0.0	0.0	0.0	34.6		
Echinacea with immunosuppressant	N	95	27	0	0	0	69	1.7	I don't know
	%	49.7	14.1	0.0	0.0	0.0	36.1		
Total knowledge of Echinacea	N	62	21	23	18	3	64	2.3	incorrect
	%	32.5	11	12	9.4	1.6	33.5		

Scoring: Incorrect = the pharmacists chose the incorrect answer about the selected herbal use, that reflect poor knowledge. 1 correct = the pharmacist selected only one correct answer from different correct choices, which indicates limited knowledge about the selected herbal use. 2 correct = the pharmacist selected only 2 correct answers, which reflects partial knowledge. 3 correct = the pharmacists selected 3 correct answers, which indicates good knowledge. 4 correct = the pharmacists' answers are correct, which reflects comprehensive knowledge. I don't know- the pharmacists reported no knowledge about the correct answer (lack of knowledge)

By using across multiple ANOVA tests, across groups (educational level, city of practice, or years of experience) regarding the knowledge of 4 selected herbal medicines - drug interaction. The means plots increase gradually for higher qualifications or for some cities/experience categories. This suggests that certain groups may have higher knowledge than others (Figure 3).

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Table 6. Results of ANOVA Tests by Education, City, and Experience Variables

Item	F statistics	P value	Result
Education-based ANOVA	7.108	0.001	significant differences
City-based ANOVA	6.262	0.002	significant differences.
Experience-based ANOVA	5.559	0.001	significant differences

Master's and PhD groups often cluster as the higher-performing groups, while Diploma holders generally appear in the lowest subset in all herbal products interaction knowledge.
Diploma < Bachelor < PhD < Master is the typical ordering.
Pharmacists with 11-15 years of experience show the highest knowledge, followed by those with more than 16 years of experience; the lowest knowledge was for 1-5 years of experience. Pharmacists in Al-Khums city illustrate more herbal-drug interaction knowledge, followed by Benghazi, and then Tripoli.

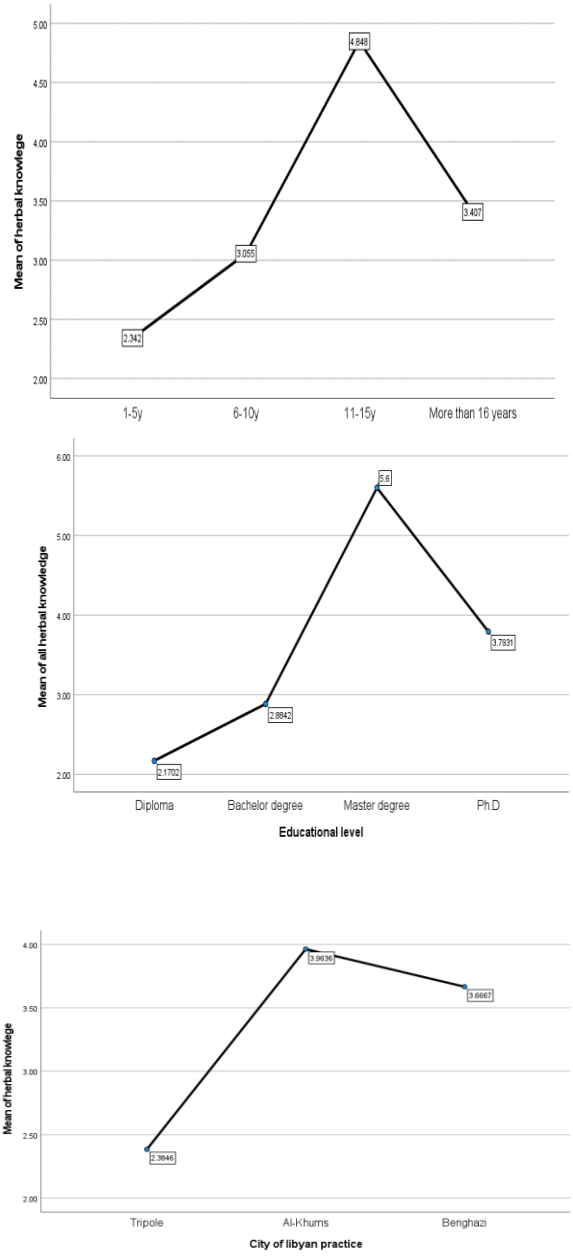

Figure 3. Herbal knowledge versus some demographic

Attitudes toward herbal medicines

From the 5-point scale findings, attitudes were largely positive. Most weighted means fall within the “Agree” range (3.41–4.20), demonstrating strong support for integrating herbal medicine into pharmacy education,

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developing herbal products-drug-interaction databases, and establishing national guidelines regarding this topic. However, perceptions of herbal medicines having fewer side effects scored 3.40 (Neutral), indicating uncertainty about their safety profile. Overall, respondents are open to enhancing standards and education regarding herbal therapy.

A significant majority of pharmacists (81.7%) expressed interest in attending future training workshops related to herbal–drug interactions. This demonstrates strong demand for continuing professional development in herbal medicine safety, highlighting gaps in current knowledge that pharmacists are willing to address (Table 7).

Table 7. Pharmacists' interest in attending future workshops on herbal drug interactions

Item	Number	Percent (%)
Yes	156	81.7
No	35	18.3

Conclusion

Herbal–drug interactions represent an important concern in modern healthcare, particularly with the widespread and often unsupervised use of herbal remedies. Despite the common belief that herbal medicines are safe, they may interfere with the pharmacological actions of prescribed medication when concomitantly used, leading to reduced therapeutic effectiveness or causing harmful effects. Insufficient knowledge of herbal–drug interactions is a global problem rather than a local one.

Pharmacists are in a key position to identify and prevent such interactions. Their role includes obtaining complete medication histories, educating patients about potential risks, and encouraging full disclosure of all substances used.

The findings of this research revealed a noticeable lack of knowledge regarding herbal medicine-drug interaction among community pharmacists in Libyan cities (Tripoli, Benghazi, and Al-Khums) and a small number from Germany and Canada, as most participants answered the survey questions incorrectly, despite self-rating positive attitudes and general herbal medicine knowledge. This emphasizes the urgent need for targeted education and training to equip pharmacists with the knowledge required to manage herbal–drug interactions effectively and ensure patient safety.

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