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Original Article

Community pharmacists' perception, attitude, and practice towards herbovigilance: a cross-sectional study in Oman

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ABSTRACT

The use of herbal medicines is widespread worldwide. However, inappropriate and irrational use may result in undesirable health outcomes. Herbovigilance plays a critical role in monitoring and reducing risks associated with herbal product use. This study assessed community pharmacists' perceptions, attitudes, and practices regarding herbovigilance in Al Dakhiliya and Ad Dhahirah Governorates, Oman. A cross-sectional study was conducted using a structured, validated online questionnaire administered to pharmacists between December 2022 and February 2023. One-way ANOVA assessed the association between socio-demographic factors and perception, attitude, and practice scores. Chi-square and Fisher's exact tests were applied to categorical variables. A total of 109 pharmacists participated, with males accounting for 51.4% of the participants. Over 80% highlighted the importance of herbal medicine safety due to limited clinical studies; 68.8% expressed concerns about poor manufacturing quality. Perceptions were significantly associated with both gender ($p < 0.001$) and age ($p < 0.05$). Undergraduates showed greater willingness to counsel patients ($p<0.05$), and those with less than ten years of experience were more willing to attend herbovigilance training ($p<0.05$). While pharmacists demonstrated good knowledge and attitudes, ADR reporting was limited. The findings highlight the need for enhanced training and education to strengthen herbovigilance practices in community pharmacy settings.

Keywords: Herbovigilance, Community pharmacists, Perception, Attitude, Practice, Adverse drug reaction

Introduction

Using herbal medicines to treat and prevent health-related problems across all ages is as ancient as history [1]. The global use of herbal drugs is steadily growing due to their growing recognition among consumers, particularly for treating chronic diseases and common disorders. Many of the existing conventional drugs commonly used today originate from plant resources, namely aspirin, digoxin, quinine, and morphine, which are among the most commonly used [2]. Drug makers are involved in conducting extensive pharmacologic screening of herbs in their ongoing pursuit of developing medications from natural plant-derived products. Herbal medicines are employed in addressing diverse health concerns such as infections (microbial and viral), hypertension, diabetes, dyslipidemia, psychiatric and immunological disorders, reproductive system disorders, cancer, and gastrointestinal ailments [3, 4].

As per the World Health Organization (WHO), herbal medicines are substances originating from plants, either raw or processed, with therapeutic properties and health benefits [5, 6]. Studies have shown that herbal medications work well for addressing a lot of medical problems [7-9]. In low-income countries, more than 80% of the individuals depend on herbal

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remedies as their main source of healthcare. Herbal medicines are widely utilized in Gulf countries due to their established safety, natural origin, and absence of adverse effects [8, 10-12]. Unlike conventional medicines, herbal medicines lack comprehensive scientific data on their risks and benefits due to the absence of stringent clinical studies and post-marketing surveillance to ensure their safety and effectiveness [13, 14]. Furthermore, there is a misconception that herbal medicines do not cause any harm to patients and that they are free from adverse effects, which is not true [15, 16]. These products have complex chemical structures, and their composition varies with geographical origin, genotype, and extraction methods. Liver toxicity, renal failure, and carcinogenic effects are likely to be noticed, especially as being uncommon or extraordinary with herbal products. Dermatologic reactions like skin irritation, phototoxicity, and hypersensitivity may result from herbal cosmetics [17-19].

Pharmacovigilance is critical to improving medication safety by assessing drug risk-benefit profiles. Spontaneous reporting by healthcare professionals and patients is a key tool in monitoring product safety [20, 21]. A retrospective analysis of Italian pharmacovigilance data showed that herbal products used in children—especially those with multiple active substances or used alongside conventional drugs—pose higher safety risks [22, 23]. Herbal medicines are often available over the counter, leading patients to use them with insufficient knowledge and alongside prescribed drugs, raising the potential for drug-herb interactions and underscoring the importance of safety monitoring [9, 24-26].

Although significant time has now passed after establishing the herbovigilance system in Oman in 2015, no published study from Oman has extensively evaluated community pharmacist perspectives on herbovigilance and ADR reporting of herbal medicines [27-30]. Besides labeling and dispensing, community pharmacists also offer patient counseling on herbal products. Evaluating community pharmacists' perception of herbovigilance and attitudes toward ADR reporting is essential. Hence, this research is intended to examine the perception, attitude, and practices of community pharmacists toward herbovigilance in community pharmacies in Al Dakhiliya and Ad Dhahirah Governorates of the Sultanate of Oman.

Materials and Methods

Study design and settings

This study, based on a cross-sectional questionnaire design, used a pre-validated instrument provided online via Google Forms for four months from December 2022 to February 2023. Prior ethical permission, before initiating the research, was secured from the Institutional Research Committee, School of Pharmacy, National Center for Statistics and Information (Approval No. 224218573), and the Directorate General of Pharmaceutical Affairs and Drug Control, Sultanate of Oman (MH/DGPA&DC/DPLD/6990). Pharmacists licensed by the Ministry of Health, Oman, with at least one month of experience in chain or independent community pharmacies in Al Dakhiliya and Ad Dhahirah governorates, were recruited after providing informed consent. Assistant pharmacists and trainee/student pharmacists were not considered for the study.

Study population and sampling

According to the 2020 annual report of DGPA and DC, 98 registered community pharmacists are in the Al Dakhiliya Governorate, and 53 are in the Ad Dhahirah Governorate. A sample size of 130 pharmacists was calculated using the Raosoft calculator (http://www.raosoft.com/samplesize.html), maintaining a 95% confidence level, an estimated response distribution of 50%, and a margin of error of ± 5% [24]. Simple random sampling methods were used to collect the sample from the sample population, and the study included community pharmacists (n=109) who fulfilled the inclusion criteria.

Study procedure

Community pharmacists were reached through in-person visits or by telephone, using contact information obtained from the Ministry of Health directory. The survey was conducted by developing a digital questionnaire using Google Forms and disseminating the survey link to the study participants using their email accounts or popular social media platforms such as WhatsApp. The authorized participants may participate in the survey by accessing the questionnaire via a shared link and providing responses to the assertions in the questionnaire. The initial page of the questionnaire contained a research information sheet outlining the purpose and goals of the study, the methodology, a statement guaranteeing the anonymity and confidentiality of the survey, and emphasizing that participation was entirely non-compulsory. Regular follow-ups were done with the study participants every one to two weeks, reminding them to complete the survey. The study data were securely maintained and exclusively utilized for the current investigation while maintaining confidentiality.

Questionnaire development and scoring system

The initial version of the 31-item questionnaire was created after thoroughly examining existing material [7, 10, 15, 18]. The questionnaire consists of 4 parts. The first part was used to record the demographic characteristics of the community pharmacists and their familiarity with the concept of herbovigilance. The second part (statements 8 to 21) was used to obtain the community pharmacist's perception of herbovigilance and drug safety-related aspects, the third part (statements 22 to 26) was used to assess attitude of pharmacists in ADRs reporting of herbal products and the fourth part (statements 27 to 31) was used to record the practices of pharmacist in ADRs reporting of herbal products. All the response statements for part II and part III were recorded using a 5-point Likert scale, including ("1 = strongly disagree," "2 = disagree," "3 = neutral," "4 = agree," and "5 = strongly agree") to rate their response. The responses for the

fourth part were marked as yes, no, or unsure (Every correct answer was provided with a score of '1' and a score of '0' for the incorrect answer).

Validation of survey tool

A pilot test involving 10 community pharmacists was carried out to assess the reliability of the questionnaire. Internal consistency was evaluated using Cronbach's alpha, which yielded a coefficient of 0.726, indicating acceptable reliability. Data from the pilot phase were excluded from the main study analysis. Three independent subject experts were invited to validate the content, and a few changes were made based on their feedback.

Data analysis

We used SPSS software (Version 28.0; IBM Corp., Armonk, NY, USA) to do the statistical analysis. For continuous variables, we showed the means and standard deviations. For categorical variables, we used frequencies and percentages to summarize the data. We looked at how socio-demographic factors were related to participants' thoughts, feelings, and actions using Pearson's chi-square test and Fisher's exact test when appropriate. We used one-way analysis of variance (ANOVA) to look at the link between age and scores on perception and practice tests linked to herbovigilance. A p-value of less than 0.05 was thought to be statistically significant.

Results and Discussion

The survey assessed community pharmacists' perceptions, attitudes, and practices toward herbovigilance in 50 Al Dakhiliya and 27 Ad Dhahirah Governorates community pharmacies from December 2022 to February 2023. The survey link was sent to 130 potential participants of the study. One hundred fourteen pharmacists completed the survey. The survey received 87.6% of responses. The responses submitted by five community pharmacists were incomplete and not considered for analysis. The final study analyzed the data of 109 participants (n=109) comprising 69 pharmacists from Al Dakhiliya and 40 pharmacists from Ad Dhahirah Governorates who met the study criteria.

Background characteristics of the study sample

More than half of the survey participants were male pharmacists (51.4%; n = 56). The average age of the respondents was 34.49 ± 9.09 years, with ages ranging between 24 and 65 years. Most of the respondents (60.6%; n = 65) were aged between 21 and 30 years, while the smallest proportion (6.42%; n = 7) belonged to the age group above 50 years. Our findings observed that most of the community pharmacists were (85.3%; n=93) bachelor's degree holders, followed by Pharm.D holders (11.9%; n=13) and Master's degree holders (2.8%; n=3). Regarding the work settings, most pharmacists (52.3%; n= 57) were employed in independent pharmacies, while the rest (48.7%; n= 52) worked in chain pharmacies. Most pharmacists (77.06%; n = 84) reported 1 to 10 years of experience in community pharmacy, with overall experience ranging from 1 to 20 years. The mean work experience was observed to be 7.174 (SD ± 6.58) years. Nearly two-thirds of the study participants were non-Omani pharmacists (62.38%; n=68), and one-third of the pharmacists were Omani nationals **(Table 1)**.

Table 1. Socio-demographic characteristics of the community pharmacists

Socio-demographics	Frequency (n=109)	Percentage
Gender		
Male	56	51.4
Female	53	48.6
Age category		
21 – 30	49	44.95
31 – 40	38	34.86
41 – 50	15	13.76
≥51	07	6.42
Mean age (years)	34.48 ± 9.09	
Level of pharmacy education		
Bachelor	93	85.32
Masters	3	2.75
Pharm.D	13	11.92
Work setting		
Independent pharmacy	57	52.29
Chain pharmacy	52	47.70
Nationality		
Non-Omani	68	62.38
Omani	41	37.61
Work experience		
1 – 10 years	84	77.06
11 – 20 years	19	17.43
≥ 21 years	06	5.50
Mean work experience (in years)	7.16 ± 6.58	

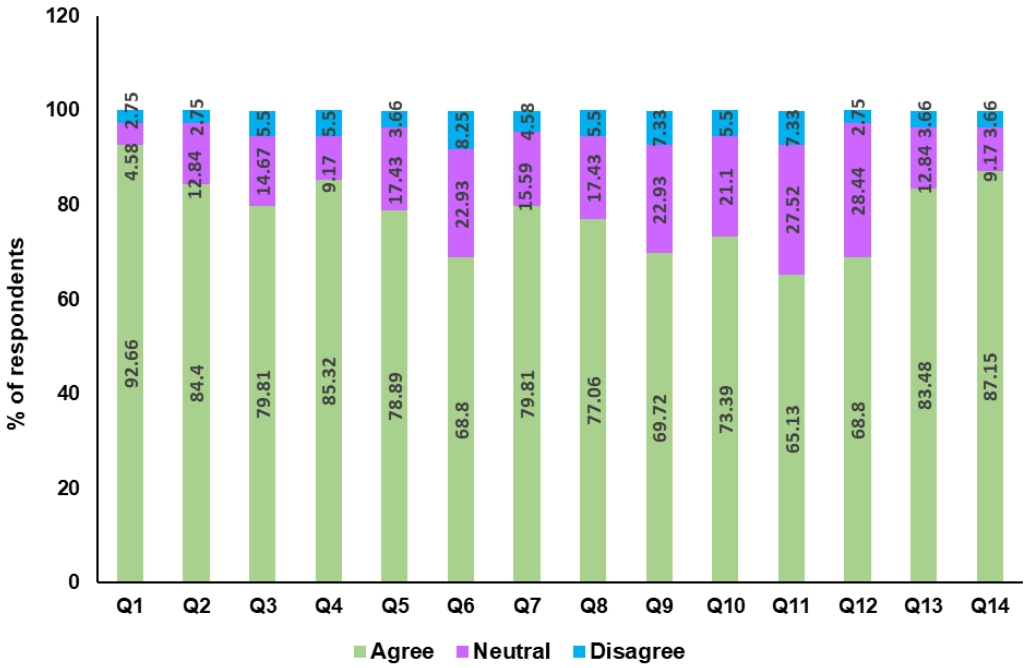
Familiarity and source of information about Herbovigilance

It was determined that all the study participants had heard about the concept of pharmacovigilance. Of the total respondents, nearly 20% heard the concept of herbovigilance during this survey and through continuing education programs and scientific journals. Others reported gaining familiarity with this concept primarily during their undergraduate or postgraduate education (28.4%) and through herbal product manufacturers (14.7%), respectively.

Community pharmacists' perception regarding Herbovigilance

The study assessed the Community pharmacists' perception of Herbovigilance. Most participants expressed agreement with all the statements related to herbal medicine safety. Furthermore, pharmacists recognized the significance of ensuring the harmlessness of herbal therapies due to the complexity of their ingredients (92.6%, n=101), unknown ADRs of herbal medicines (85.3%, n=93), adulteration/counterfeiting and presence of impurities (79.8%, n=87), insufficient clinical trials

performed on herbal medicines (78.9%, n=86) and difficulty in standardization of herbal medicines (76.1%, n=83) **(Figure 1)**.

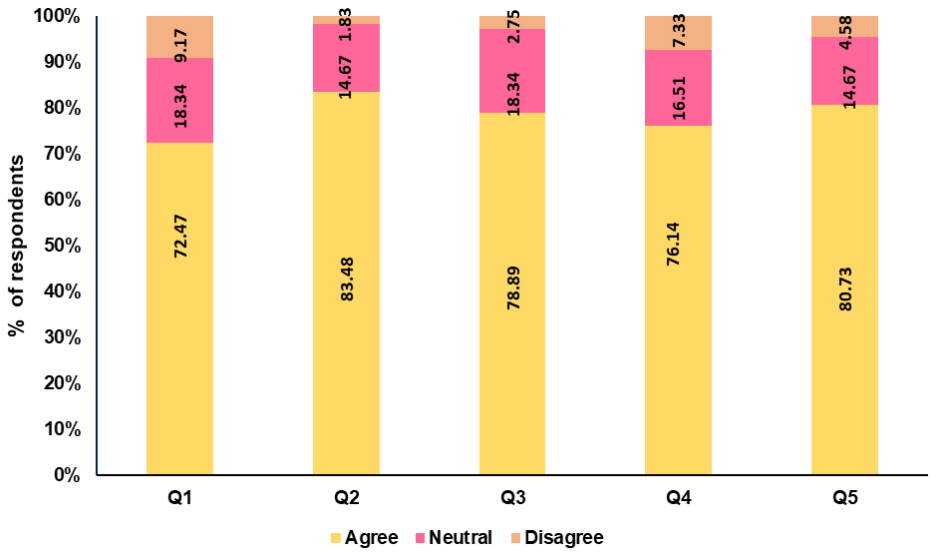


1. The safety of herbal medicines is important due to the complex structure of their constituents.
2. Deciding whether herbal products are accountable for a certain adverse reaction is difficult.
3. The safety of herbal products is significant because they are difficult to standardize.
4. Compared to synthetic drugs, Herbal products have fewer side effects because they are from natural sources.
5. The safety of herbal products is vital because it may have impurities
6. Herbal medicines have stability and expiration date problems
7. The safety of herbal medicines is important because the Adverse Drug Reactions (ADRs) are unknown.
8. Herbal products can cause adverse events like hepatotoxicity and nephrotoxicity.
9. The safety of herbal medicines is important because insufficient clinical trials are performed on them.
10. ADRs reporting of Herbal medicines by Pharmacists is mandated by DGPA & DC.
11. The safety of herbal medicines is important because the manufacturing quality of these products is low.
12. The professional role of Pharmacists in medication safety also includes reporting the ADRs of herbal products.
13. The safety of herbal medicines is important because adulteration/counterfeiting is a common problem they encounter.
14. To improve patient safety, ADRs of herbal products should be reported, as with synthetic medicines.

Figure 1. Community pharmacists' perception regarding herbovigilance

Community pharmacist's attitude regarding herbovigilance

More than three-quarters of the pharmacists (76.1%; n=83) expressed their confidence in reporting ADRs of herbal medicines if encountered during their practice. A significant proportion of pharmacists (83.5%; n=91) showed their preparedness to counsel patients regarding the proper utilization of herbal medicines throughout the dispensing process. Additionally, a majority of pharmacists (72.4%; n=79) expressed their willingness to promptly notify regulatory authorities about any herbal drugs that prove to be ineffective **(Figure 2)**.

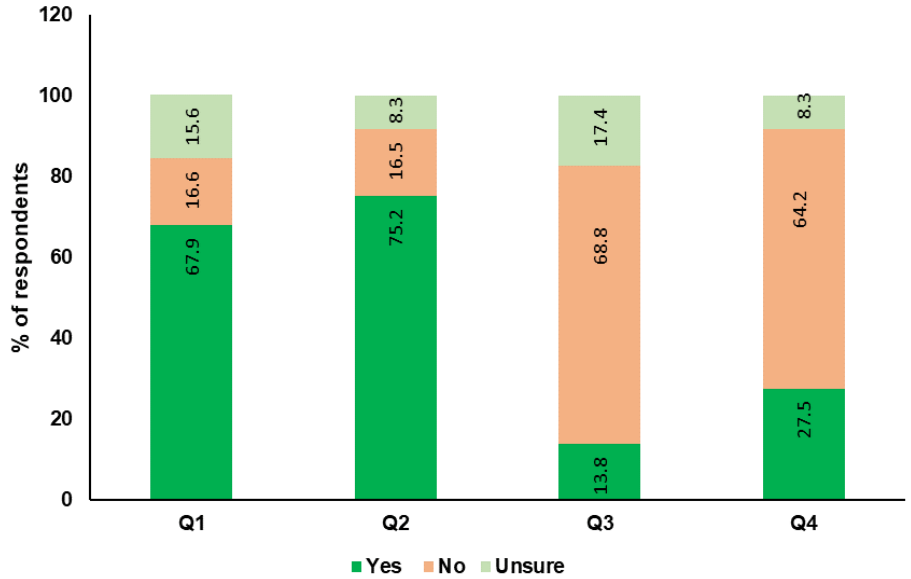


1. I report if the herbal medicine is observed to be ineffective
2. I am confident enough to report ADRs of herbal medicines if I encounter any during my practice
3. I am ready to counsel my patients about the use of herbal medicines that I dispense.
4. I want to attend the continuing education programs on herbovigilance and related aspects.
5. I want to take part in awareness-raising campaigns for the safe use of herbal products.

Figure 2. Community pharmacist's attitude regarding herbovigilance

Community pharmacists' practice towards herbovigilance

The study showed that pharmacists dispensed herbal medicines from their pharmacies. Three-fourths of the pharmacists dispensed herbal medicines based on the efficacy of the herbal product (75.2%; n=82), while pharmacists (67.9%; n=74) dispensed herbal medicines based on the manufacturing company. The study evidenced that a small proportion of the pharmacists (13.8 %; n= 15) reported ADRs of herbal medicines during their practice **(Figure 3)**.



1. I dispense herbal medicines from my pharmacy based on a manufacturing company.
2. Have you ever reported an ADR of herbal products while practicing in Oman?
3. I dispense herbal medicines from my pharmacy based on the efficacy of herbal products.
4. Did you attend any education or training courses regarding Herbovigilance and ADR reporting in Oman?

Figure 3. Community pharmacist's practice regarding herbovigilance

Influence of socio-demographic characteristics on perceptions regarding herbovigilance

A statistically significant number of female pharmacists agree that "The safety of herbal medicines is important because ADRs of these products are unknown" compared to male pharmacists. Similarly, the percentage of responses to "ADRs reporting of Herbal medicines by pharmacists is mandated by DGPA & DC" is also statistically significant, with an increase in the age groups. No significant differences were observed in perception statements based on pharmacy education level, work experience, or nationality **(Table 2)**.

Table 2. Association of socio-demographics with perception of herbal medicines

Association of demographics with perception			Disagree	Neutral	Agree	p-value
The safety of herbal medicines is important because the ADRs of these products are unknown.	Gender	Male	4	20	32	**0.004***
		Female	05	05	43	
		Total	**09**	**25**	**75**	
ADRs reporting of Herbal medicines by pharmacists is mandated by DGPA & DC	Age (Years)	21 – 30	03	20	26	**0.010***
		31 – 40	00	05	33	
		≥ 41	00	06	16	
		Total	**03**	**31**	**75**	
The professional role of a Pharmacist in medication safety also includes reporting the ADRs of herbal products.	Level of Pharmacy Education	B Pharm	04	12	77	0.077**
		Masters	00	02	01	
		Pharm D	00	00	13	
		Total	**04**	**14**	**91**	
To improve patient safety, ADRs of herbal products should be reported, as with synthetic medicines	Work experience	1 – 10	03	10	72	0.181**
		11 – 20	00	00	18	
		≥ 21	01	00	05	
		Total	**04**	**10**	**95**	
The safety of herbal products is significant because they are difficult to standardize.	Nationality	Non–Omani	03	04	34	0.063*
		Omani	00	10	58	
		Total	**03**	**14**	**92**	

*chi-squared test ; **Fisher's exact test ; $p<0.05$ is statistically significant

Socio-demographic determinants of attitudes toward herbovigilance

The results indicate a statistically significant relationship between the participant's response and the amount of education of the respondents for the given statement, "I am ready to counsel my patients about the use of herbal medicines which I dispense" ($p<0.005$). However, the study participants' gender, age, and work experience did not show any statistical significance to the attitude statements related to herbovigilance **(Table 3)**.

Table 3. Association of socio-demographics with the attitude towards herbal medicines

Association of demographics with attitude			Disagree	Neutral	Agree	p-value
I am ready to counsel my patients about the use of herbal medicines, which I dispense.	Level of Pharmacy Education	B Pharm	01	12	80	**0.046****
		Masters	01	00	02	
		Pharm D	00	04	09	
		Total	**02**	**16**	**91**	
I report if the herbal medicine is observed to be ineffective	Age (Years)	21 – 30	08	08	33	0.227**
		31 – 40	02	07	29	
		≥ 41	00	05	17	

		Total	**10**	**20**	**79**	
I want to attend the continuing education programs on herbovigilance and related aspects.	Work experience	1 – 10	04	13	68	0.472**
		11 – 20	01	01	16	
		≥ 21	00	02	04	
		Total	**05**	**16**	**88**	

*chi-squared test; **fisher's exact test ; p<0.05 is statistically significant

Socio-demographic influences on herbal medication practices

No significant variations in herbovigilance practice or usage were observed across most socio-demographic variables of the study population, except for work experience and nationality. These two factors showed statistically significant associations with the statements, 'Did you attend any education or training course regarding herbovigilance and ADR reporting of herbal products in Oman?' and 'Have you ever reported an adverse drug reaction (ADR) of a herbal product while practicing in Oman?' Additionally, most study participants across all age groups demonstrated a positive practice towards the statement, 'I stock and dispense herbal medicines that are registered with DGPA & DC from my pharmacy,' although this finding was not statistically significant **(Table 4)**.

Table 4. Association of socio-demographics with the practice of herbal medicines

Association of demographics with practice			**Yes**	**No**	**Unsure**	**p-value**
I stock and dispense herbal medicines registered with DGPA & DC from my pharmacy.	Age (Years)	21 – 30	26	12	11	0.058*
		31 – 40	30	04	04	
		≥ 41	18	02	02	
		Total	**74**	**18**	**17**	
Did you attend any education or training course regarding Herbo vigilance and ADR reporting of herbal products in Oman	Work experience	1 – 10	30	49	06	**0.003****
		11 – 20	00	15	03	
		≥ 21	00	06	00	
		Total	**30**	**70**	**09**	
Have you ever reported an adverse drug reaction (ADR) to a herbal product while practicing in Oman?	Nationality	Non–Omani	10	24	07	**0.046***
		Omani	05	51	12	
		Total	**15**	**75**	**19**	

*chi-squared test; **fisher's exact test; p<0.05 is statistically significant

Association of age with perception and practice of herbovigilance

Significant differences across age groups were found for perception statements such as 'Pharmacists are mandated by DGPA & DC to report ADRs of herbal medicines' and 'Ensuring the safety of herbal medicines is essential because the adverse drug reactions (ADRs) linked to these products remain largely unknown.' Likewise, age was significantly associated with practice statements, including 'I report when a herbal medicine is observed to be ineffective' and 'I feel confident reporting ADRs of herbal medicines encountered during practice.

Interrelationship of the perception, attitude, and practice scores towards herbovigilance

The relationship among participants' perception, attitude, and practice scores related to herbovigilance was examined. Results showed a strong positive correlation between perception and attitude, and between attitude and practice. This indicates that a positive perception significantly impacts attitude ($p < 0.01$), which in turn is significantly associated with improved herbovigilance practices ($p < 0.01$).

Individuals ' utilization of herbal products, including cosmetics and medicines, has increased significantly globally and in the Middle Eastern Gulf countries. As evidenced by previous studies, easy availability without prescription from various resources raises concerns about its safety [15, 20, 31-33]. This study evaluated community pharmacists' perceptions, attitudes, and practices regarding herbovigilance in the Al Dakhiliyah and Ad Dhahirah governorates (muhafazah) of Oman.

This study recorded a high response rate (87.2%) from participants, comparable to Al Qurbiet *et al.* (82.4%) and higher than a study in Yemen (41.8%) [34-37]. This indicates that pharmacists show a strong willingness to engage in knowledge-based activities to enhance their understanding of healthcare disciplines. It was observed that 28.44% of participants had heard of pharmacovigilance during their undergraduate/graduate education. This reflects growing integration of herbal pharmacotherapy in pharmacy curricula. On the other hand, less than 20% of participants reported that they had learned during this survey. This indicates a need for further training on the utilization of herbal medications, notwithstanding their

significant and growing prevalence in the community. It was determined that 18.34% of respondents heard about pharmacovigilance through attending continuous education programs. An Istanbul study reported that 13.1% of participants in their study learned the term in such programs [38].

The survey findings indicate that a significant majority (80% or more) of the participants recognize the crucial significance of ensuring the safety of herbal medicines. This recognition stems from the intricate composition of their elements, the' existence, and standardization' challenges. Evidence from the literatures describes herbal medicines as complex pharmaceutical products whose chemical ingredients vary with their preparations [39-41]. A Saudi Arabian study reported that individuals are least bothered about the purity of the available herbal medicines before use [14]. A physician-based study found poor quality control to be a major safety concern, discouraging herbal use. [10] This calls for better regulation and monitoring to ensure efficacy and safety.

Many participants agreed on the importance of monitoring herbal ADRs, citing reasons such as lack of clinical trials, low manufacturing quality, and possible adulteration or counterfeiting. The popularity of herbal medicines has grown with a widespread belief that they are naturally derived, safe, and without side effects [42]. A study conducted in Saudi Arabia has revealed that individuals use herbal medicines along with their concomitant medicines according to their online research and through aggressive advertisement campaigns [10]. This increases the likelihood of potentially hazardous drug interactions and adverse reactions, as well as the possibility of pharmacological and toxicological effects on each other, limiting therapeutic outcomes. This suggests that herbal medicines should be available only in pharmacies and dispensed upon presenting a valid prescription, similar to conventional medicines. Conversely, some participants believed herbal medicines have fewer side effects and found it difficult to attribute ADRs to them. The findings emphasize the possibility of a misunderstanding or lack of knowledge among the participants regarding herbal medicines' negative consequences and interactions, despite the high occurrence of reported side effects in existing research [15, 19, 31].

Research from Kuwait and Saudi Arabia indicates that nearly 30% of community pharmacists have insufficient knowledge regarding the harmful effects and possible interactions related to herbal therapies [43, 44]. Implementing regular, targeted educational initiatives is essential to enhance pharmacists' competencies, ensure patient safety, and support the rational use of herbal products. Supplementing such programs with safety data will further enhance pharmacists' ability to protect patients. Regarding ADR reporting, most respondents acknowledged that pharmacists have a professional duty to report ADRs for herbal products, as they do for conventional drugs, and support reporting as mandated by the DGPA and DC. Pharmacovigilance among healthcare professionals, especially spontaneous ADR reporting, is critical to building a national drug safety database [20]. Community pharmacies should also have access to evidence-based tools, including updated herbal textbooks and drug interaction databases, to support safe herbal drug use. In terms of attitude, most participants had a positive outlook on herbal ADR reporting.

A considerable number of respondents supported counselling patients seeking herbal remedies, engaging in awareness campaigns, and attending continuing education focused on ensuring the safety of herbal medicine use and ADR reporting. Higher education has a well-documented influence on the views and attitudes of individuals [45, 46]. The community pharmacists' favorable outlook on herbal products as both safe and efficacious has the potential to sway patients, who may feel more at ease incorporating these items alongside their prescribed medications. The findings of our study were consistent with those found among pharmacists in other countries [47, 48].

Community pharmacists' good perception of herbal medicines was expected to impact the adequate practice of herbovigilance. Indeed, the practice of herbovigilance by the community pharmacists was limited ($p>0.005$), with a low level of ADR reporting and a lack of attending training or health education programs regarding herbovigilance and ADR reporting. This strongly indicates the need for practical training, workshops, and seminars to improve herbovigilance practices. Doing so would positively impact public health through safer herbal medicine use and improved patient care. Studies have reported barriers to ADR reporting, such as a lack of information, uncertainty about where to find or how to submit forms, confusion about reporting protocols, difficulty identifying ADRs, and time constraints [38, 49].

Concerning the association of socio-demographic factors with perception, attitude, and practice of herbovigilance, education level, work experience, and age (years) were found to be significant ($p <0.005$). These results underline the importance of professional experience and educational background in shaping ethical and effective clinical practices. Advancing education and training, alongside accumulated experience, equips pharmacists to better guide the public on rational medicine use and reduce the risk of adverse effects linked to herbal products [42, 50].

A few limitations are associated with this study. The cross-sectional design captured data at only one point in time, which restricts the ability to observe temporal changes. Moreover, the use of self-administered questionnaires may have resulted in response bias, as participants could have been unwilling to fully disclose their actual practices. Additionally, the potential for recall bias cannot be entirely excluded. The study was limited to two governorates and involved a relatively small sample of community pharmacists, which may affect the generalizability of the findings. Given Oman's ethnic and cultural diversity, pharmacists' perceptions, attitudes, and practices toward herbovigilance may vary across different regions. Therefore, additional investigations using broader and more diverse participant samples are advised to obtain more robust and generalizable insights into herbovigilance practices and the challenges associated with ADR reporting for herbal products. This research should involve a larger sample size of respondents

from diverse populations, specifically targeting various governorates of Oman.

Conclusion

Findings from the study indicate that community pharmacists possess sufficient knowledge and maintain a favorable attitude toward herbovigilance. However, poor practice in reporting ADRs also exists. It is essential that practicing community pharmacists transform their knowledge to foster the pharmacovigilance practice of herbal medicines to provide desired pharmaceutical care to patients. Structured educational programs and adequate training assist the community pharmacist in providing evidence-based information to patients with a holistic approach when seeking help on herbal products. Harmonization of the herbovigilance and providing incentives to increase ADR reporting by healthcare professionals are needed to enhance drug safety. As preliminary research, this survey provides important insight into the perceptions, attitudes, and practices of community pharmacists toward herbovigilance.

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