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Original Research

Assessment of knowledge and counseling practice of warfarin among pharmacists in UAE: A cross-sectional study

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Abstract

Objective: Background: Warfarin has long been regarded as the cornerstone anticoagulant for patients requiring long-term prevention or treatment of thromboembolic disorders. With adequate knowledge and counseling skills, hospital and community pharmacists can play a major role in enhancing warfarin therapy. Objective: to evaluate the knowledge and counseling practices toward warfarin among community and hospital pharmacists in UAE. **Methods:** A cross-sectional study involving community and hospital pharmacies was conducted with online questionnaire which was submitted to pharmacists focusing on their pharmacotherapeutic knowledge and patient education toward warfarin in UAE. Data were collected within 3 months (July, August and September 2021). SPSS Version 26 was used to analyze the data. The survey questions were sent to expert researchers in pharmacy practice for comments on their relevancy, clarity, and essentiality. **Results:** Among the target population sample size of 400 pharmacists were approached. Majority of the pharmacists in UAE (157/400, 39.3%) had 1-5 years of experience. Most of the participants (52%) have fair knowledge about warfarin and (62.1%) of them have fair counseling practices about warfarin. Hospital pharmacists have more knowledge than community pharmacists (Mean rank, Independent pharmacy: 166.30, Chain pharmacy: 138.01, Hospital pharmacy: 252.27, $p<0.05$) and they have better counseling practice than community pharmacists (Mean rank, Independent pharmacy: 188.83, Chain pharmacy: 170.18, Hospital pharmacy: 222.90, $p<0.05$). **Conclusion:** The study's participants had moderate knowledge and counseling practices of warfarin. As a result, specialized training in warfarin therapy management for pharmacists is needed to improve therapeutic outcomes and avoid complications. Moreover, conferences or online courses should be held to train pharmacists on how to provide professional counseling to patients.

Keywords: warfarin; community pharmacists; hospital pharmacists; knowledge; counseling; UAE

INTRODUCTION

The clinical use of anticoagulants is of high importance in the treatment and prevention of many cardiovascular diseases. Venous thromboembolism (VTE) is the third most common cardiovascular disease, affecting at least 700,000 people in North America each year.[1]

Acute pulmonary embolism (PE) approximately affects 5% of the population during their lifetime. Patients with VTE are treated with anticoagulant (AC) therapy for at least three months to prevent thrombus extension, embolization, and recurrences.[2]

Warfarin is one of the drugs that had been used for many decades for the prevention and treatment of thromboembolism. It is considered one of the very best 15 prescribed medications in the US, with quite 2 million patients receiving it.[3]

The risk of bleeding is higher in patients receiving warfarin with other anticoagulants or with aspirin. Pharmacists should be actively involved in educating the patients about the proper use of warfarin and check that the patients use it in the correct dose with the correct frequency and duration. In addition, they should educate the patients about the interactions with warfarin e.g. taking warfarin with vitamin K will reduce the effect of warfarin.[4]

In addition to medications, healthcare professionals should be aware of the increased risk of bleeding when consuming several foods and herbs. Chinese wolfberry, chamomile tea, cranberry, chitosan, green tea, Ginkgo biloba, ginger, spinach, St. John's Wort, sushi, and smoking tobacco are examples of these.[5]

All the clinical considerations can be accomplished by the pharmacist. Pharmacists –conducting patient counseling can lead to many benefits such as optimization of drug therapy, improvement in the quality of patient care, and reduction in healthcare costs.[6]

It has been demonstrated that involving hospital pharmacists in admission and discharge has resulted in fewer medication errors and ADEs, as well as a significant reduction in the rate of all-cause ED visits and hospital readmissions.[7]

In a study conducted by Izzettn, et al. the goal was to determine the impact of pharmacist consultation, education, and intervention on patient therapeutic outcomes. A cross-sectional randomized trial was conducted, with 25 patients participating. In conclusion, pharmacist interventions within warfarin management process, through counseling and education, were found to create good outcomes in patients'

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quality of life, treatment satisfaction, and level of awareness regarding their treatment, as well as better therapeutic outcomes and reduced risk of complications.[8]

The objectives of the study are to evaluate the pharmacological knowledge about warfarin among community and hospital pharmacists in UAE, to evaluate the appropriate counseling practices of warfarin among community and hospital pharmacists in UAE, and to compare between community and hospital pharmacists regarding knowledge and counseling practices of warfarin in UAE.

METHODOLOGY

A cross-sectional study involving community and hospital pharmacies was conducted with an online questionnaire that was submitted to pharmacists focusing on their pharmacotherapeutic knowledge and patient education toward warfarin. The questionnaire was sent to pharmacists through email and WhatsApp. Data were collected within 3 months (July, August, and September 2021). Ethical approval was taken from DPC-REC to start the distribution of the survey questions to hospital and community pharmacists in the UAE.

The survey questionnaire was based on a previous study conducted in KSA.[3] Comparing the knowledge and counseling practice of warfarin between community and hospital pharmacists, with some changes made after submitting it to pharmacists for feedback (at the pilot phase).

The questionnaire is divided into three parts: demographic data which includes gender, age, degree of qualification, year of graduation, work experience in UAE, pharmacy type, and number of prescriptions dispensed per day, etc.

Pharmacological knowledge-related questions (9 questions) include MOA of warfarin, indications, side effects, use of warfarin in pregnancy and breastfeeding, contraindications, target INR, days needed for warfarin to start its action, and drug interactions of warfarin.

While counseling part (6 questions) includes: dispensing warfarin in UAE, checking the prescription of warfarin before dispensing, asking the patient to limit the intake of green leaves, asking the patient if he takes vitamin K supplements and asking the patient to limit the intake of garlic, ginger, cinnamon and ginkgo.

According to a study conducted in UAE, the total number of pharmacists in UAE is 8469.[9] Using the Sample size calculator, the minimum recommended sample size was 368 pharmacists [95% confidence interval (CI), 5% margin of error, and 50% population proportion]. We set a goal of recruiting 400 pharmacists as participants.

Inclusion criteria: This study targets community and hospital pharmacists in UAE carrying a Bachelor's or masters of pharmacy.

Exclusion criteria: Other health care practitioners e.g., Physicians and nurses and Pharmacy technicians or pharmacists carrying diplomas in pharmacy.

The survey questions were sent to expert researchers in pharmacy practice for comments on their relevancy, clarity, and essentiality. Before collecting data, a pilot test was performed to compute the Cronbach's alpha value to measure scale reliability (internal consistency) and avoid errors. The survey questionnaire was tested in a pilot test with a smaller sample size than the planned sample size (20 participants). This pilot survey was sent to pharmacists for review. Cronbach's alpha for knowledge questions was 0.730, while it was 0.844 for counseling questions.

The data were analyzed using the Statistical Package for Social Science (SPSS) V.26. Data frequency, participant knowledge, and counseling scores were also obtained. The data were subjected to the Mann-Whitney and Kruskal-Wallis tests in order to determine the P value. The Mann-Whitney test was used to calculate the P value of the questions that has only 2 categories or groups while the Kruskal-Wallis test was used to calculate P value of the questions that contain more than 2 categories or groups.

RESULTS

Characteristics of the participants

Among the target population sample size of 400 pharmacists was approached. As shown in Table 1, (162/400, 40.5%) were male and (238/400, 59.5%) were female. Most of the participants were in the age between 22-29 years (129/400, 32.3%) and 30-39 years (179/400, 44.8%). The majority of them have a Bachelor of pharmacy (369/400, 92.3%). Most of the participants graduated between the year 2011-2021(172/400, 43.0%).

Table 1. Descriptive analysis of pharmacists' demographic data frequency

Demographic Data		Frequency	Percentage %
Gender	Male:	162	40.5
	Female:	238	59.5
	Total:	400	100
Age	22-29 years	129	32.3
	30-39 years	179	44.8
	40-49 years	86	21.5
	50-59 years	6	1.5
	Total	400	100
Degree of qualification	Bachelor of pharmacy	369	92.3
	Master of pharmacy	31	7.8
	Total	400	100
Year of graduation	1990-2000	71	17.8
	2001-2010	157	39.3
	2011-2021	172	43.0
	Total	400	100

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Work experience in UAE	< 1 year	9	2.3
	1-5 years	157	39.3
	6-10 years	129	32.3
	11-15 years	61	15.3
	>15 years	44	11.0
	Total	400	100
Pharmacy Type	Independent pharmacy	32	8.0
	Chain pharmacy	161	40.3
	Hospital pharmacy	201	50.3
	Clinical pharmacy	6	1.5
	Total	400	100
Number of prescriptions dispensed per day	less than 50	14	3.5
	50-100	192	48.0
	> 100	194	48.5
	Total	400	100

Experiences of pharmacists were divided as follows: (9/400, 2.3%) had less than 1 year of experience, (157/400, 39.3%) had 1-5 years of experience, (129/400, 32.3%) had 6-10 years of experience, (61/400, 15.3%) had 11-15 years of experience and (44/400, 11.0%) had more than 15 years of experience.

The type of pharmacy the participants worked in is divided as follows:

(32/400, 8%) in independent pharmacy, (161/400, 40.3%) in chain pharmacy, (201/400, 50.3%) in hospital pharmacy and (6/400, 1.5%) in clinical pharmacy. The number of prescriptions dispensed per day by the pharmacists was as follows: (14/400, 3.5%) dispensed less than 50 prescriptions, (192/400, 48.0 %) dispensed 50-100 prescriptions and (194/400, 48.5%) dispensed more than 100 prescriptions.

Overall scoring of pharmacological knowledge and counseling practice of warfarin

A scoring system of the overall knowledge of warfarin was done as follows:

Total score was out of 15

Less than or equal to 10 out of 15 considered poor

11-13 out of 15 considered fair

14-15 out of 15 considered good

According to Figure 1, most of the participants (52%) have fair knowledge about warfarin.

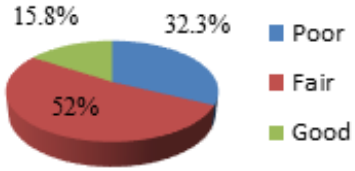

Figure 1. Overall Warfarin knowledge scores among participants

A scoring system of the overall counseling practice of warfarin was done as follows:

Total score was out of 12

Less than or equal to 7 out of 12 considered poor

8-10 out of 12 considered fair

11-12 out of 12 considered good

According to Figure 2, most of the participants (62.1%) have fair counseling practice about warfarin.

The results in Table 2 indicated a significant difference of knowledge between males and females. Males have shown more knowledge than females (Mean rank, females: 188.94, males: 217.48, $p<0.05$).

There is a significant difference between age ranges and pharmacological knowledge of warfarin, age range of 50-59

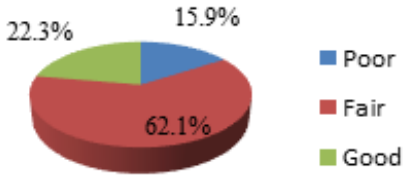

Figure 2. Overall Warfarin counseling practice scores among participants

Table 2. Associations between demographic data and knowledge

Demographic Data		Mean Rank	P value
Gender	Male	217.48	0.014*
	Female	188.94	
Age	22-29 years	136.77	0.000*
	30-39 years	213.58	
	40-49 years	262.13	
	50-59 years	297.17	
Degree of qualification	Bachelor of pharmacy	193.78	0.000*
	Master of pharmacy	280.50	
Year of graduation	1990-2000	268.27	0.000*
	2001-2010	218.77	
	2011-2021	155.85	
Work experience in UAE	< 1 year	173.78	0.000*
	1-5 years	162.21	
	6-10 years	205.91	
	11-15 years	263.34	
	>15 years	239.61	
Pharmacy Type	Independent pharmacy	166.30	0.000*
	Chain pharmacy	138.01	
	Hospital pharmacy	252.27	
Number of prescriptions dispensed per day	less than 50	160.00	0.000*
	50-100	148.65	
	> 100	254.73	

years showed better knowledge than other age ranges (Mean rank, 22-29 years: 136.77, 30-39 years: 213.58, 40-49 years: 262.13, 50-59 years: 297.17 p<0.05).

Significant difference is shown between degrees of qualification of participants and knowledge, in which participants with master's degree of pharmacy have better knowledge than participants with bachelor degree of pharmacy (Mean rank, bachelor of pharmacy: 193.78, master of pharmacy: 280.50, p<0.05).

There is a highly significant difference between year of graduation and knowledge, in which participants who graduated in years from 1990-2000 showed the best knowledge (Mean rank, 1990-2000: 268.27, 2001-2010: 218.77, 2011-2021: 155.85, p<0.05).

Participants who had 11-15 years of experience in UAE have better knowledge than others and a highly significant statistical difference (Mean rank, < 1 year: 173.78, 1-5 years: 162.21, 6-10 years: 205.91, 11-15 years: 263.34, > 15 years: 239.61, p<0.05) are found.

There is a highly significant difference between pharmacy type and knowledge, with the best knowledge in participants working in hospital pharmacies (Mean rank, Independent pharmacy: 166.30, Chain pharmacy: 138.01, Hospital pharmacy: 252.27, p<0.05).

Participants dispensing more than 100 prescriptions per day have better knowledge than other participants (Mean rank, less than 50: 160.00, 50-100: 148.65, more than 100: 254.73, p<0.05).

However, hospital pharmacists have more knowledge than community pharmacists (Mean rank, Independent pharmacy: 166.30, Chain pharmacy: 138.01, Hospital pharmacy: 252.27, p<0.05).

The results in Table 3 showed no significant difference in counseling practice between males and females (Mean rank, females: 193.84, males: 210.29, p>0.05). There is significant difference between age ranges and counseling practice of warfarin, age range of 50-59 years showed better counseling practice than other age ranges (Mean rank, 22-29 years: 169.60, 30-39 years: 216.52, 40-49 years: 208.00, 50-59 years: 279.33, p<0.05).

Significant difference is shown between degree of qualification of participants and counseling practice, in which participants with masters of pharmacy have better counseling practice than participants with bachelor of pharmacy (Mean rank, bachelor of pharmacy: 195.31, master of pharmacy: 262.23, p<0.05).

There is significant difference between year of graduation and counseling practice, in which participants who graduated in years from 1990-2000 showed the best counseling practice (Mean rank, 1990-2000: 220.86, 2001-2010: 212.06, 2011-2021: 181.54, p<0.05).

Participants who had 11-15 years of experience in UAE have better counseling practice than others and very significant statistical differences (Mean rank, < 1 year: 143.50, 1-5 years: 180.32, 6-10 years: 207.63, 11-15 years: 243.86, > 15 years: 203.15, p<0.05).

There is a highly significant difference between pharmacy type and counseling practice, with best counseling practice among participants working in hospital pharmacy (Mean rank, Independent pharmacy: 188.83, Chain pharmacy: 170.18, Hospital pharmacy: 222.90, p<0.05). Participants dispensing more than 100 prescriptions per day have better counseling practice than other participants (Mean rank, less than 50: 219.14, 50-100: 177.06, more than 100: 222.35, p<0.05).

However, hospital pharmacists have better counseling practice than community pharmacists (Mean rank, Independent pharmacy: 188.83, Chain pharmacy: 170.18, Hospital pharmacy: 222.90, p<0.05).

Table 3. Associations between demographic data and counseling practice

Demographic Data		Mean Rank	P value
Gender	Male	210.29	0.153
	Female	193.84	
Age	22-29 years	169.60	0.001*
	30-39 years	216.52	
	40-49 years	208.00	
	50-59 years	279.33	
Degree of qualification	Bachelor of pharmacy	195.31	0.002*
	Master of pharmacy	262.23	
Year of graduation	1990-2000	220.86	0.012*
	2001-2010	212.06	
	2011-2021	181.54	
Work experience in UAE	< 1 year	143.50	0.002*
	1-5 years	180.32	
	6-10 years	207.63	
	11-15 years	243.86	
	>15 years	203.15	
Pharmacy Type	Independent pharmacy	188.83	0.000*
	Chain pharmacy	170.18	
	Hospital pharmacy	222.90	
Number of prescriptions dispensed per day	less than 50	219.14	0.000*
	50-100	177.06	
	> 100	222.35	

DISCUSSION

Proper pharmacy services are essential since they improve patient safety and contribute to the well-being of patients and citizens. It is widely believed that pharmacists play an important role in patient counseling and medication knowledge, which are both fundamental for patient safety.

Pharmacists have been shown to have a positive impact on delivering care and limiting inappropriate prescribing, as well

as on lowering healthcare costs by avoiding hospitalization or limiting hospital length of stay.[10]

Warfarin is classified as a high-risk medication due to its narrow therapeutic index and the major complication, bleeding, which necessitates medical supervision.[11]

The current study was the first study assessing the knowledge and counseling practice of warfarin in the UAE, so in this study, authors attempted to evaluate the knowledge and counseling practice toward warfarin among pharmacists in UAE. The importance of this study is that the researchers believe pharmacists play a critical role in patient care by reviewing prescriptions, identifying potential interactions, and preventing them from occurring. Furthermore, with proper patient counseling, pharmacists can help to attain the best therapeutic goal with the lowest number of side effects and drug-drug or drug-food interactions.

Overall findings in this study have shown that pharmacists had moderate knowledge and counseling practice about warfarin, compared with the hospital pharmacists being more knowledgeable and having more counseling practice than community pharmacists, which is consistent with the findings of a study conducted in 2014 in Saudi Arabia.[3]

This means that pharmacists' knowledge and counseling practices are still inadequate, which is a major limiting step in achieving optimal treatment outcomes for warfarin-treated patients.

Moreover, the results of a study conducted in Jordan in 2019 which assessed the knowledge of warfarin among community pharmacists showed that there is inadequate knowledge of warfarin.[11]

Pharmacists included in the current research were mostly hospital pharmacists and community pharmacists having 1- 10 years of experience in the UAE, with most of them dispensing more than 50 prescriptions per day.

In the current study, male pharmacists were having more knowledge toward warfarin than female pharmacists. This is opposite to the results of a study conducted in Lebanon in 2018 which found that female pharmacists had a significantly higher knowledge score compared to male pharmacists.[12] Another study conducted in Ethiopia in 2017 showed that females had more knowledge than males, which is opposite to the findings of the current study.[13]

Pharmacists between the ages of 50-59 years, and those who graduated in years between 1990 and 2000 have superior knowledge and counseling practice. This makes sense to us since these pharmacists have long years of experience in the pharmacy field and many practical skills. An online questionnaire was used in a cross-sectional study in Qatar in 2018 to assess hospital and community pharmacists' knowledge of direct oral anticoagulants. Surprisingly, the participant's age and years of experience did not affect their percentage awareness score.[14]

Another study in Jordan in 2019 evaluated the community pharmacists' knowledge of direct oral anticoagulants and warfarin by interviewing the pharmacists and found that participants' age and years of experience had no effect on their knowledge.[11] These results of both studies were opposite to our results.

In the current study, pharmacists with master's degrees demonstrated superior knowledge and counseling practices than those with bachelor's degrees, which is similar to the findings of a study conducted in 2019 by Eljilany et al, which assessed warfarin awareness among HCPs and found that HCPs with master's had greater awareness than fresh graduate HCPs with a bachelor's degree.[15]

Another study conducted in Jordan in 2019 assessed the knowledge of anticoagulants and warfarin among community pharmacists and discovered that pharmacists carrying a doctor of pharmacy degree have more knowledge regarding warfarin in comparison with the pharmacists who hold bachelor's degree.[11] This could be attributed to advancements in the training and practical skills provided to pharmacists with higher degrees.

The lack of knowledge among the current study's participants about the adjusted level of INR or the days required for warfarin to begin acting will undoubtedly have a negative impact on their roles and the therapeutic outcomes of patients.[11]

Furthermore, our study participants' responses indicate that they have difficulty identifying warfarin drug and food interactions, which is similar to a study conducted on 153 pharmacists in Saudi Arabia in 2014 in which only 30% or less of the participants could identify warfarin's interactions.[3]

Furthermore, this research indicates that pharmacists have insufficient patient counseling practice. Some researchers believe that this result may be due to barriers in the counseling process itself, such as a lack of education in patients, counseling provided to caregivers, a lack of interest from patients, and the patient's perception of pharmacists as sellers.[16,17]

According to a study conducted by Choumane et al, they think that it can be difficult for pharmacists to have a sufficient level of knowledge about warfarin interactions to deal with various clinical scenarios and actively participate in patient care.[18] Therefore, the use of drug interactions detecting software should be considered while dispensing warfarin to the patients in the pharmacies.

In the current study, authors noted that the majority of pharmacists stated that they rarely ask patients if they use herbal medications. This could be due to the underestimation of the pharmacists regarding the unsafe use of herbal medications and their potential interactions with warfarin, or it could be due to pharmacists' lack of knowledge about warfarin drug-food interactions. Al-Arifi et al. in their study which evaluated the knowledge of Health Care Professionals on warfarin interactions with drug and herbal medicines and conducted in 2014, reported findings similar to the current study indicating that the majority of HCPs had limited

knowledge of herb-warfarin interactions.[19] Another two studies conducted in Sudan showed that community pharmacists have a poor level of knowledge about food and drug interactions which is relatively similar to our findings.[20,21]

Participants in the current study who dispensed more than 100 prescriptions per day had better knowledge and counseling practices than other participants. This finding is consistent with the findings of a study conducted in 2005 in the United States that assessed community pharmacists' attitudes toward and knowledge of oral chemotherapy and found that pharmacists who dispensed a greater number of oral chemotherapy prescriptions had higher scores and more correct answers than others.[22]

A study conducted by Al-Arifi et al. in Saudi Arabia investigated the knowledge of various healthcare providers, including physicians, nurses, and pharmacists, regarding warfarin and herbal interactions. The findings revealed that 83.9 percent of pharmacists who took part in the study provided the correct answer regarding the interaction between aspirin and warfarin. Furthermore, 22.6 percent of participating pharmacists correctly identified the interaction of multivitamin supplements with warfarin.[19]

In comparison to the current study, 96.5% and 88.5% of the pharmacists were able to identify some of the drugs that interact with warfarin and vitamin K interaction with warfarin, respectively.

It is believed that pharmacists' involvement in patient care for patients receiving warfarin therapy will have significant outcomes in the therapeutic goals and will reduce the nonadherence of patients.[23] Involving hospital pharmacists in admission and discharge of patients has been shown to result in fewer prescribing errors and ADEs, as well as a considerable reduction in the rate of all-cause ED visits and hospitalizations.[7]

Proper counseling practices by pharmacists are thought to contribute to better therapeutic outcomes in patients. A study conducted in Ibadan, Nigeria, assessed the impact of oral anticoagulant counseling training on the quality of counseling provided by pharmacists by conducting a two-week online training, claiming that pharmacists improved the quality of counseling they provided to patients, resulting in better therapeutic response.[24]

To sum up, we believe that pharmacist's interventions within the warfarin management activities, such as counseling and education, can improve patients' welfare, treatment satisfaction, and level of awareness about their treatment, as well as optimal therapeutic outcomes and a lower risk of complications. In addition, the interventions of pharmacists have an impact on reducing the high medical costs associated with treatments.

LIMITATIONS

The current study had few limitations; the data were self-reported, which may have introduced some bias in the participant's responses including careless responding and whether the participants answered the survey from their own knowledge or they relied on specific references. However, authors succeeded to reach sample size target which is 400 respondents. Furthermore, they believe that these limitations would have little impact on the integrity of data.

CONCLUSION

Our findings indicated that pharmacists in UAE have moderate knowledge and counseling practice toward warfarin where hospital pharmacists have superior knowledge and counseling practice than community pharmacists. This results in negative impact of therapeutic outcomes and quality of life of the patients. However, pharmacists should enhance their knowledge and counseling practice through engaging themselves in specialized training courses to increase self-confidence and improve their communication skills with patients.

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CONFLICTS OF INTEREST

No conflicts of interest associated with this work.

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