

## Original Research

# Assessment of knowledge, attitude and practice of Lebanese pharmacists in providing patient counseling on urinary tract infection and its treatment

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### Abstract

**Background:** Urinary tract infection (UTI) is the second most common type of infections, accounting for about 7 million annual visits to health-care providers. Pharmacists have an important role in counseling patients about this disease. **Objectives:** The study explored the Lebanese pharmacists' knowledge, attitudes and counseling practices (KAP) around UTI. The aim was to provide a better understanding on the pharmacist role in this context, and improve the patient care process and the health of the public. **Methods:** A cross-sectional knowledge attitudes practice study was conducted and enrolled pharmacists who were practicing in the community setting. The questionnaire collected data about the sociodemographic characteristics, pharmacist's knowledge about UTIs, their attitudes and practice in providing patient counseling. **Results:** A sample of 450 pharmacists was reached, the majority (>90%) of which had good knowledge about UTIs. Moreover, greater than 90% of pharmacists believe that UTIs are serious, and that being unhygienic is one of its causes (93.6%). The majority reported educating patients about the most common causes (90.4%), risk factors (88.4%) and preventive measures (95.1%) of UTIs. A mean score of 8.44 was reported for the knowledge score and multivariable linear regression has shown that female pharmacists have higher knowledge score than males. A significant association between having a PhD degree and believing that men are more prone to UTI. Furthermore, the province of the pharmacists' practice, being in Beirut, was positively and significantly correlated with better practice. **Conclusions:** Lebanese pharmacists are well knowledgeable about UTIs and showed good attitude and practice in this field. This study provides insight for discussion with policy makers to upgrade legislation to enable pharmacists to legally prescribe antibiotics for uncomplicated UTIs, similar to other countries, to improve the patient care process and minimize the burden of the disease.

**Keywords:** Attitudes; Counseling; Knowledge; Pharmacist; Practice; Urinary Tract Infection

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## INTRODUCTION

Urinary tract infection (UTI) is the second most common type of infections, accounting for about 7 million annual visits to health-care providers.<sup>1,2</sup> In US and Europe, UTIs are accountable for around 15% of all community-prescribed antibiotics.<sup>3-5</sup> Healthcare professionals play a vital role in educating the community around various conditions including UTIs.<sup>6</sup> Being highly knowledgeable and accessible, pharmacists in the community and outpatient settings are frequently approached by the public for health related concerns and consultations.<sup>7</sup> Pharmacists reportedly counsel patients on the clinical presentation of different infections, medication use and adverse events.<sup>8</sup> According to a study conducted by Darwich et al., 88.9% clinical cure rate of UTI was reported among the enrolled patients along with very high levels of satisfaction for the received care, mutual trust, and pharmacists' accessibility.<sup>9</sup>



Lebanon, a middle-high income country, is passing through severe socioeconomic crisis associated with national deterioration and limited accessibility to medical resources.<sup>10</sup> Lebanese pharmacists are substantial healthcare providers that provide various services to the community especially in the urban regions.<sup>11</sup> In 2018, according to a comprehensive view of the epidemiologic characteristics of UTIs among the population living in Beirut, an overall prevalence of UTI of 20.4% was reported.<sup>12</sup>

Lebanese pharmacists play a crucial role in the healthcare system. They are able to screen patients, refer individuals with complicated infections or who are at risk for complications, to appropriate venues of care and prescribe antibiotics in accordance with clinical guidelines to those meeting eligibility criteria. Legislation to practice pharmacy in Lebanon is general and doesn't include specific practices. Because of their vital role, the Lebanese pharmacists' knowledge and skills have been studied in various communicable and non-communicable conditions. During the Coronavirus Disease 2019 (COVID-19) pandemic, a cross-sectional study was conducted to assess the knowledge, attitude and practice of pharmacists in Lebanon towards this outbreak. Findings revealed an appropriate level of knowledge and good practice towards COVID-19. Participants were able to know > 90% of the knowledge-based questions regarding COVID-19.<sup>13</sup> Nonetheless, scarce data are available around the pharmacist role in UTIs.<sup>14</sup> Consequently, it remains unclear in this context how Lebanese pharmacists perceive their role in counselling their patients. In addition, a couple of questions are yet to be answered around to which degree pharmacists perceive themselves competent to provide proper counselling, and to which extent pharmaceutical care in this area is currently implemented in pharmacy practice. This study explored the Lebanese pharmacists' knowledge, attitudes and counselling practices (KAP) around UTI. Our aim was to provide a better understanding on the pharmacist role in this context and improve the patient care process and the health of the public.

## METHODS

### Study design and participants

A cross-sectional KAP study was conducted and enrolled pharmacists who were practicing in the community setting. Any pharmacist not meeting these criteria was excluded. A snowball sampling technique was used to gather information on pharmacists from different Lebanese regions between February and May 2021. The main data to be investigated were the following: sociodemographic characteristics, knowledge, attitude and practice of the participants meeting the inclusion criteria. The study protocol was approved by the research and ethics committee of the school of pharmacy at the Lebanese International University, which waived the signature of informed consent as the study carried no physical, psychological or social risk. Anonymity and confidentiality of all participants were warranted as personal identifiers were not reported or tracked.

### Study instrument

The questionnaire administered in this study was developed and validated in another research.<sup>15</sup> Two authors carried out the forward-backward translation to Arabic, the native language of Lebanon, and modifications to reflect customs and practices in Lebanon were done by consensus. Pharmacists were initially approached through phone calls, mails and visits to the community pharmacies to explain the study purpose and procedure before self-administering the questionnaire. Most of the responses were collected online through Google Forms. The questionnaire consisted of a total 32 questions distributed over four parts.

The first part included questions about the sociodemographic characteristics relating to age, gender, highest education level, years of practice experience and status of continuing education. The second part focused on the pharmacist's knowledge concerning what UTI is, main symptoms and main cause. Additionally, it asked the pharmacists whether they follow guidelines in prescribing antibiotics and which antibiotics they prescribe usually. The third part assessed the pharmacist's attitude; it asked whether the pharmacist believes that drinking plenty of water, taking antibiotics, consuming vitamin C and antioxidant-rich food helps in reducing the occurrence of UTI or not. The last part included questions related to the practice of pharmacists in providing patient counselling on UTI and its treatment. This part was composed of 13 Yes/No questions. The scope of these questions was to assess if pharmacists educate patients about hygiene, food they have to take, risk factors and complications.

### Study population

The convenient sample was selected from all the Lebanese districts. The pharmacists and pharmacies that were included were selected to maximize sample variation, which included urban and rural settings, large and small pharmacies. A review of existing literature and based on calculations conducted through Epi Info™;<sup>16</sup> a sample size of 384 pharmacists was suggested. This sample size would be adequate to ensure generalizability of responses. Accordingly, 450 questionnaires were sent back and included in the study.

### Statistical analysis

Data were analyzed using IBM Statistical Package for Social Sciences (SPSS version 21). Descriptive statistics evaluated the sociodemographic characteristics of pharmacists. Continuous variables were reported by their means and standard deviation. Categorical variables were reported by their frequencies and percentage. A knowledge score was calculated to assess pharmacists' knowledge in providing patient counselling on UTI and its treatment. The nine questions in the "knowledge" part of the questionnaire were included in the score calculation. Each correct answer was given 1 mark so each pharmacist got a score out of 9. The bivariate analysis between the knowledge score and different covariates included different parametric and non-parametric tests. Student T-test one way ANOVA and Kruskal-Wallis were utilized accordingly. Chi-square test was used for determining the association between qualitative variables.



Correlation between quantitative variables was assessed using Spearman correlation coefficient. A multivariable linear regression was conducted for the knowledge score for variables with  $P < 0.2$  in the bivariate analysis to preclude residual confounders. A multivariable logistic regression was utilized for the attitude and practice part for variables with  $P < 0.2$  in the bivariate analysis. Results were reported as unadjusted beta or adjusted odds ratio ORa with a 95% confidence interval. The level of significance was set at  $P \leq 0.05$  with an acceptable margin of error = 5%.

## RESULTS

### Sociodemographic characteristics

A total sample of 450 pharmacists was reached. The sample included 70.7% females, 60.9% Bachelor of Pharmacy (BPharm) holders, 82.4% with less than 5 to 10 years of practice experience, 56.7% practicing in Beirut, the capital of Lebanon, and more than 67% have a continuing medical education through conferences and reviewing guidelines updates. The full sociodemographic characteristics of the pharmacists are shown in table 1.

	Categories	N (%)
<b>Gender</b>	Male	132 (29.3)
	Female	318(70.7)
<b>Age (years)</b>	20-29	296 (65.8)
	30-39	122 (27.1)
	40-49	24 (5.3)
	≥50	8 (1.8)
<b>Education level</b>	BPharm	274 (60.9)
	PharmD	148 (32.9)
	PhD	10 (2.2)
	Others	18 (4)
<b>Experience (years)</b>	<5–10	379 (84.2)
	11–20	56 (12.4)
	> 20	15 (3.3)
<b>Province of the pharmacy</b>	Beirut	255(56.7)
	Outside Beirut	195(43.3)
<b>Regularly attend conferences</b>	Yes	302 (67.1)
	No	148 (32.9)
<b>Read new guidelines and updates</b>	Yes	320 (71.1)
	No	130 (28.9)

BPharm: Bachelor of Pharmacy; PharmD: Doctor of Pharmacy; PhD: Doctor of Philosophy

### Pharmacist's knowledge

The majority of the pharmacists were able to determine the main cause and symptoms of UTI. The majority (94%) of the included participants were aware that bacteria is the main cause of UTI, and 83.3% chose dysuria as the main symptom of UTI in men. Most of the pharmacists got the right answer upon asking about which drug is not safe in pregnancy. Cotrimoxazole, being the right answer, was the most chosen answer by 72.2%. Though penicillin and cephalosporins are wrong answers, a

minority of the pharmacists selected those drugs (7.6% and 20.2% respectively). The results of the pharmacist's knowledge part are shown in table 2.

	Categories	N (%)
<b>What is UTI?</b>	Correct	450 (100)
<b>Most common cause</b>	Bacteria	421 (94)
	Protozoa	1 (0.2)
	Fungi	3 (0.7)
	Hygiene	23 (5.1)
<b>Responsible organism</b>	E. coli	438 (97.3)
	Mycobacterium bovis	6 (1.3)
	Hepatitis-B virus	1 (0.2)
	Mycoplasma	5 (1.1)
<b>Symptom of UTIs in men</b>	Erectile dysfunction	25 (5.6)
	Vaginal discharge	3 (0.7)
	Dysuria	375 (83.3)
	None of the above	47 (10.4)
<b>What is dysuria?</b>	Correct	444 (98.7)
	Not correct	6 (1.3)
<b>What is hematuria?</b>	Correct	445 (98.9)
	Not correct	5 (1.1)
<b>What is proteinuria?</b>	Correct	449 (99.8)
	Not correct	1 (0.2)
<b>What is the treatment?</b>	Correct	449 (99.8)
	Not correct	1 (0.2)
<b>Which drug is not safe during pregnancy?</b>	Cotrimoxazole	325 (72.2)
	Penicillin	34 (7.6)
	Cephalosporin's	91 (20.2)
<b>Drinking plenty of water helps</b>	Yes	432 (96)
	No	18 (4)
<b>Antibiotics helps in management</b>	Yes	422 (93.8)
	No	28 (6.2)
<b>Lack of hygiene causes UTI</b>	Yes	421 (93.6)
	No	29 (6.4)
<b>Regular health checkups are helpful</b>	Yes	333 (74)
	No	117 (26)
<b>Vitamin C and antioxidant-rich food prevent UTI</b>	Yes	255 (56.7)
	No	195 (43.3)
<b>Men are more prone to UTI</b>	Yes	59 (13.1)
	No	391(86.9)
<b>Only bacteria causes UTI</b>	Yes	83 (18.4)
	No	367 (81.6)
<b>UTIs are serious</b>	Yes	408 (90.7)
	No	42 (9.3)
<b>Educate about hygiene</b>	Yes	430 (95.6)
	No	20 (4.4)
<b>Suggest food to take</b>	Yes	330 (73.3)
	No	120 (26.7)
<b>Ask about current chronic medications</b>	Yes	400 (88.9)
	No	50 (11.1)
<b>Educate regarding the cause</b>	Yes	407 (90.4)
	No	43 (9.6)
<b>Educate about risk factors</b>	Yes	398 (88.4)
	No	52 (11.6)



<b>Educate about the complications</b>	Yes No	381 (84.7) 69 (15.3)
<b>Educate about preventive measures</b>	Yes No	428 (95.1) 22 (4.9)
<b>Educate on proper medication regimen</b>	Yes No	427 (94.9) 23 (5.1)
<b>Educate regarding the nonpharmacological measures</b>	Yes No	420 (93.3) 30 (6.7)
<b>Consider similar previous episodes</b>	Yes No	419 (93.1) 31 (6.9)
<b>If yes, prescribe another antibiotic</b>	Yes No	301 (70.0) 129 (30)
<b>Follow up with the patient</b>	Yes No	366 (81.3) 84 (18.7)
<b>Advise patients with recurrent UTIs to do urine culture</b>	Yes No	427 (94.9) 23 (5.1)

KAP: Knowledge, Attitude, Practice, UTI: Urinary Tract Infection

### Pharmacist's attitude

Greater than 90% of pharmacists believe that UTIs are serious and that being unhygienic causes UTIs (93.6%). As well, the majority believe that regular health checkup can be helpful in preventing its occurrence (74%). The majority of the pharmacists believe that drinking plenty of water, taking antibiotics, and the intake of vitamin C rich food helps in UTI (96%, 93.8%, and 56.7% respectively). Minority of the pharmacists believe that men are more prone to UTI (13.1%) and that only bacteria cause UTIs (18.4%). Details around pharmacists' attitudes are reported in table 2.

### Pharmacists' practice

The majority reported educating patients about the most common causes (90.4%), risk factors (88.4%) and preventive measures (95.1%) of UTIs. More than 95% of the pharmacists educate patients regarding proper hygiene, beneficial food (73.3%), and the nonpharmacological measures (93.3%) that help in the treatment of UTI. More than 88% ask patients about concurrent medications used to preclude the risk of drug-drug interactions. The majority of the pharmacists educate about the possible complications (84.7%) and on the proper medication regimen (94.9%). Greater than 93% of the pharmacist ask the patient if they had previously experienced a similar episode and prescribe a different antibiotic accordingly (70%) or advise patients to undergo a urine culture (94.9%). More than 80% of the pharmacist tend to follow up with the patient post counselling. Details about pharmacists' practices are reported in table 2.

### Knowledge score

A mean score of 8.44 was given for the knowledge score, with a minimum of 5 and a maximum of 9. The bivariate analysis of sociodemographic characteristics as independent variables and the knowledge score as the dependent variable have shown a significant association between knowledge score and gender (P-value = 0.023), and between knowledge score

and educational level (P-value = 0.044). Table 3 shows the bivariate analysis between knowledge score and different sociodemographic characteristics.

	Knowledge score N (mean ± SD) or N (r)	P-value	
<b>Gender</b>		0.023*	
Male	132 (8.3 ± 0.92)		
Female	318 (8.5 ± 0.7)		
<b>Age (rho)</b>	450 (-0.003)	0.95	
<b>Education level</b>		0.044*	
BPharm	274 (8.43 ± 0.79)		
PharmD	148 (8.49 ± 0.71)		
PhD	10 (8.1 ± 0.88)		
Other	18 (8.33 ± 0.84)		
<b>Experience</b>		0.27	
<5-10	379 (8.43 ± 0.76)		
11-20	56 (8.43 ± 0.83)		
>20	15 (8.67 ± 0.82)		
<b>Province of the Pharmacy</b>		0.28	
Beirut	255 (8.47 ± 0.74)		
Outside Beirut	195 (8.4 ± 0.8)		
<b>Attend conferences</b>		0.5	
Yes	302 (8.46 ± 0.77)		
No	148 (8.4 ± 0.8)		
<b>How often</b>		0.091	
Once yearly	117 (8.38 ± 0.75)		
Twice yearly	134 (8.42 ± 0.83)		
Other	51 (8.65 ± 0.66)		
<b>Read guidelines</b>		0.4	
Yes	320 (8.46 ± 0.76)		
No	130 (8.39 ± 0.79)		
	<b>Yes, vitamin C prevents UTI</b>	<b>No, vitamin C doesn't prevent UTI</b>	<b>P-value</b>
	N (%) or mean (±SD)		
<b>Gender</b>			0.3
Males	70 (27.5)	62 (31.8)	
Females	185 (72.5)	133 (68.2)	
<b>Age</b>	28.71 ± 5.61	28.97 ± 7.07	0.67
<b>Educational Level</b>			0.12
BPharm	162 (63.5)	112 (57.4)	
PharmD	83 (32.5)	65 (33.3)	
PhD	4 (1.6)	6 (3.1)	
Other Degrees	6 (2.4)	12 (6.2)	
<b>Experience</b>			0.13
<5-10 years	215 (84.3)	164 (84.1)	
10-20 years	35 (13.7)	21 (10.8)	
>20 years	5 (2)	10 (5.1)	
<b>Province of the Pharmacy</b>			0.3
Beirut	139 (54.5)	116 (59.5)	
Outside Beirut	116 (45.5)	79 (40.5)	
<b>Attend conferences</b>			0.8
Yes	170 (56.3)	85 (57.4)	
No	132 (43.7)	63 (42.6)	



<b>How often attend conferences</b>			
Once Yearly	62 (37.1)	55 (40.7)	0.6
Twice Yearly	78 (46.7)	56 (41.5)	
Others	27 (16.2)	24 (17.8)	
<b>Read guidelines</b>			
Yes	180 (56.3)	42 (32.3)	0.8
No	140 (43.8)	88 (67.7)	
	<b>Men are more prone</b>	<b>Men are less prone</b>	<b>P-value</b>
	N (%) or mean (±SD)		
<b>Gender</b>			
Males	21 (35.6)	111 (28.4)	0.3
Females	38 (64.4)	280 (71.6)	
<b>Age</b>	28.97 (6.39)	28.8 (6.27)	0.85
<b>Educational Level</b>			
Pharm	36 (61)	238 (60.9)	0.09
Pharm	18 (30.5)	130 (33.2)	
PhD	4(6.8)	6 (1.5)	
Other Degrees	1(1.7)	17 (4.3)	
<b>Experience</b>			
<5-10 years	49 (83.1)	330 (84.4)	0.72
10-20 years	7 (11.9)	49 (12.5)	
>20 years	3 (5.1)	12 (3.1)	
<b>Province of the Pharmacy</b>			
Beirut	31(52.5)	224(57.3)	0.5
Outside Beirut	28(47.5)	167(42.7)	
<b>Attend conferences</b>			
Yes	41 (69.5)	261 (66.8)	0.7
No	18 (30.5)	130 (33.2)	
<b>How often attend conferences</b>			
Once Yearly	16 (41)	101 (38.4)	0.9
Twice Yearly	16 (41)	118 (44.9)	
Others	7 (18)	44 (16.7)	
<b>Read guidelines</b>			
Yes	38 (64.4)	282 (72.1)	0.2
No	21 (35.6)	109 (27.9)	
	<b>Ask about current chronic medications</b>	<b>Doesn't ask about current chronic medications</b>	<b>P-value</b>
	N (%) or mean (±SD)		
<b>Gender</b>			
Males	117 (29.3)	15 (30)	0.12
Females	283 (70.8)	35 (70)	
<b>Age</b>	28.66 (6)	30.16 (8.09)	0.2
<b>Educational Level n (%)</b>			
BPharm	243 (60.8)	31 (62)	0.12
PharmD	135 (33.8)	13 (26)	
PhD	9 (2.3)	1 (2)	
Other Degrees	13 (3.3)	5 (10)	
<b>Experience</b>			
<5-10 years	338 (84.5)	41 (82)	0.001*
10-20 years	53 (13.3)	3 (6)	
>20 years	9 (2.3)	6 (12)	
<b>Province of the Pharmacy</b>			
Beirut	228 (57)	27 (54)	0.7
Outside Beirut	172 (43)	23 (46)	

<b>Attend conferences</b>			
Yes	273 (68.3)	29 (58)	0.15
No	127 (31.8)	21 (42)	
<b>How often attend conferences</b>			
Once Yearly	104 (38)	13 (46.4)	0.5
Twice Yearly	122 (44.5)	12 (42.9)	
Others	48 (17.5)	3 (10.7)	
<b>Read guidelines</b>			
Yes	294 (73.5)	26 (52)	0.002*
No	106 (26.5)	24 (48)	

KAP: Knowledge, Attitude, Practice; SD: Standard Deviation; BPharm: Bachelor of Pharmacy; PharmD: Doctor of Pharmacy; PhD: Doctor of Philosophy; UTI: Urinary Tract Infection  
\*Statistically significant

The multivariable linear regression has shown that female pharmacists have higher knowledge score than males ( $\beta=0.152$ , 95%CI 0.063:0.45, P-value=0.01). A significant positive association was also found between frequent conference attendance and knowledge score. Pharmacists who attend conferences more than twice yearly have significantly higher score of knowledge ( $\beta=0.14$ , 95%CI 0.035:0.54, P-value=0.03). No significant association between knowledge score and educational level has been shown. The multivariable linear regression of predictors of knowledge score is reported in table 4.

	Knowledge score	
	$\beta$ (95% CI)	P-value
<b>Gender</b>		
Female vs. Male	0.152 (0.063; 0.45)	0.01*
<b>Educational Level</b>		
BPharm	Reference	
PharmD	-0.05 (-0.27;0.09)	0.35
PhD	-0.08 (-0.84;0.15)	0.17
Other Degree	-0.01 (-0.5;0.4)	0.85
<b>How often attend conference</b>		
Once Yearly	Reference	
Twice Yearly	0.07 (-0.08;0.3)	0.28
Other than once or twice yearly	0.14 (0.035;0.54)	0.03*

BPharm: Bachelor of Pharmacy; PharmD: Doctor of Pharmacy; PhD: Doctor of Philosophy  
\*Statistically significant

### Associations between pharmacists' demographics and attitude

No association was found between any of the demographic factors and whether vitamin C is effective or not and whether men are prone to UTI or not. The results of the bivariate analysis for both questions are presented in table 3.

As for the question related to vitamin C, the multivariable



logistic regression showed similar results to the bivariate analysis. No significant associations were shown between both educational level and experience to whether pharmacists believe vitamin C and antioxidant-rich food may prevent UTI or not. On the other hand, a significant association between having a PhD degree and believing that men are more prone to UTI (ORa=0.23, 95%CI 0.06:0.84, P=0.03) (table 5).

Table 5. Multiple variable logistic regression between pharmacists' demographics and attitude/practice		
	Yes Men are more prone	
	ORa (95% CI)	P-value
<b>Educational Level</b>		
BPharm	Reference	
PharmD	1.1 (0.6;2)	0.77
PhD	0.23 (0.06;0.84)	0.03*
Other degree	2.57 (0.33;19.9)	0.37
	<b>Yes Chronic Medications</b>	
	ORa (95% CI)	P-value
<b>Experience</b>		
<5-10	Reference	
10-20	0.51 (0.15;1.73)	0.28
>20	6.3 (2.04;19.4)	0.001*
<b>Attend conferences (No reference)</b>	1.27 (0.67;2.42)	0.46
<b>Read guidelines( No reference)</b>	2.47 (1.3;4.66)	0.005*
	<b>Yes Urine Culture</b>	
	ORa (95% CI)	P-value
<b>Province of the Pharmacy (Outside Beirut, reference)</b>	2.95 (1.18; 7.37)	0.02*
<b>Attend conferences (Yes vs No)</b>	1.78 (0.734;4.33)	0.2
<b>Read guidelines (Yes vs No)</b>	1.97 (0.81;4.79)	0.13

BPharm: Bachelor of Pharmacy; PharmD: Doctor of Pharmacy; PhD: Doctor of Philosophy

\*Statistically significant

### Associations between pharmacist's demographics and practice

There was a significant association between being more experienced and asking the patient about current chronic medications to avoid any drug-drug interaction (P-value=0.001). Another association was noted with pharmacists who read newly published guidelines (P-value=0.002). Details of all other analyses that showed no association are presented in table 3.

Logistic regression showed a significantly positive association between both having experience more than 20 years and reading guidelines, and asking patients about their chronic medications (P-value=0.001, ORa=6.3, 95%CI 2.04:19.4) and (P-value=0.005, ORa=2.47, 95%CI 1.3:4.66) respectively. The details of this analysis is shown in table 5.

Moreover, the multivariable analysis showed that attending conferences (P-value=0.2, OR=1.78, 95%CI 0.73:4.33) and

reading new guidelines (P-value= 0.13, OR=1.97, 95%CI 0.81:4.79) were not associated with a better practice related to ordering urine culture for suspected UTIs. However, the province of the pharmacists' practice, being in Beirut, (P-value=0.02, OR=2.95, 95%CI 1.18:7.37) was positively and significantly correlated with better practice (table 5).

## DISCUSSION

This study explored KAP of Lebanese pharmacists around UTI. We found that majority of the pharmacists are able to recognize the main cause of UTI, the responsible organisms and main symptoms in men. Similarly, they were aware of the three medical conditions known as: dysuria, proteinuria and hematuria. Upon calculating the knowledge score based on the nine asked questions of this section, a mean score of 8.44 was obtained. This reflects a high pharmacists' knowledge around UTI. Lower level of knowledge was found in India, a knowledge score of 4.56/9 among pharmacists and 7.02/9 among internship students were reported.<sup>15</sup> Consequently, Lebanese pharmacists are considered to have a good and satisfying level of knowledge.

We found that the majority of the pharmacists believe that UTIs are serious and that regular health checkup can be helpful in preventing its occurrence. A recently published article mentions that urinary tract infections have a wide variety of presentations. Some are simple UTIs that can be managed with outpatient antibiotics and lead to almost universally good outcomes. Whereas, other UTIs could be a leading cause of hospitalization, sepsis and increased mortality.<sup>17</sup> Our findings add to the literature that pharmacists have a good level of awareness about the consequences of UTIs and suggest an important role of pharmacists in optimizing patient care and improving the clinical outcomes.

The role of other behavioural factors was also assessed. A higher percentage of the pharmacists believed that being unhygienic increases the risk of infection, which could be true. Research have shown that there is an evident relation between UTIS and practices of personal hygiene.<sup>18</sup> In addition, the majority of the pharmacists believe that drinking plenty of water and a good intake of vitamin C rich food help in UTI, which is also true. Dehydration may increase the risk of UTIs that can lead to confusion, falls, acute kidney injury and hospital admission.<sup>19</sup> It was shown that staying hydrated reduces UTIs and improves outcomes in care homes.<sup>20</sup> Similarly, Bazzaz et al. investigated the efficacy of vitamin C in the management of UTIs. The study concluded that vitamin C supplementation is able to control the symptoms of UTI in children and reduce their recurrences in pregnant women.<sup>21</sup>

Our results showed reasonable beliefs of pharmacists in the management of UTI with antibiotics. This was not surprising because the participants have demonstrated a high level of knowledge, which allow them to provide an evidence-based care. In fact, studies have shown that clinical outcomes for UTIs treated with antibiotics are better when compared to those treated with a placebo.<sup>22</sup> Studies also showed that adult



women are 30 times more likely than men to develop a UTI.<sup>22</sup> We found that Lebanese pharmacists are fully aware about this, as the majority of participants believed that men are less likely to develop UTIs. A study conducted in 2020 aiming to assess pharmacists' attitude towards managing patients presenting with complaints of UTI in the community pharmacy setting showed that pharmacists have several interactions per day with patients in which they counsel them on a variety of issues, including UTI.<sup>23</sup> The findings of that study are consistent with ours.

Our findings showed found that pharmacists spend enough time counselling their patients regarding different issues including UTIs. Pharmacists, with increasing presences in the community, hospital and ambulatory care settings, are well positioned to have important roles in the assessment and management of UTIs.<sup>24</sup> In the current study, pharmacists reported educating the patients about the causes, proper hygiene, preventive measures and common risk factors in order to avoid any infection. Infected patients were also counselled about the medication regimen, as well as the dietary and nonpharmacological measures. Furthermore, the pharmacists tend to ask the patients if they had a similar previous episode and prescribe another antibiotic to overcome any resistance. This is very important for the patient care process, as different antimicrobials with susceptible pattern can help eradicating the infection and minimizing the burden of resistance.<sup>25</sup> This approach is also associated with better outcomes. Nonetheless, the situation is more complicated in Lebanon, as Lebanese pharmacists prescribe and dispense antibiotics, despite this being prohibited by the Lebanese legislation.<sup>26</sup> In several countries around the world, national laws have enabled pharmacists to prescribe antibiotics for various infections. Uncomplicated UTI is one of the ambulatory conditions for which pharmacists in New Brunswick have the ability to prescribe.<sup>27</sup> In Quebec, pharmacists can prescribe for UTI in females if the patient has had a UTI diagnosis and a prescription to treat it within the previous year.<sup>28</sup> The current study adds to the literature an important role of pharmacists regardless being antimicrobial prescribers or not. In fact, pharmacists can play an important role in determining the severity of a UTI and ensuring that the antimicrobial treatment prescribed is appropriate.<sup>24</sup>

We found that female pharmacists have higher knowledge score than males. The level of pharmacists' knowledge around different infections appear to vary across the nations. A recent survey in Pakistan assessed knowledge, attitude, and Practices of community pharmacists regarding COVID-19. The study revealed that females have lower odds of good knowledge as compared with their male counterparts.<sup>29</sup> The reason for this appears related to a higher level of education among males in in Pakistan.<sup>29</sup> This is not the case for Lebanon as gender equity is warranted in the education of pharmacy and other medical and nonmedical majors.

A significant positive association was found between frequent conference attendance and knowledge. Pharmacists who attend conferences more than twice yearly have significantly higher score of knowledge. Therefore, frequent participation

in continuing education activities have a significant role to improve knowledge. A similar positive impact was shown in a study conducted in Malaysia to evaluate the impact of an educational training program on the knowledge, attitude and perceived barriers of community pharmacists towards obesity and overweight management. The overall mean knowledge score increased both immediately after the intervention and 30 days later, and the increment was statistically significant 30 following the intervention.<sup>30</sup>

A significant positive association was found between both having experience more than 20 years and reading guidelines, and asking patients about their chronic medications. This can be explained by the fact that senior pharmacists have greater experience and confidence in counselling their patients. This is predicted when community pharmacists gain expertise over years of work, resulting in comparable knowledge and eventually a larger degree of engagement in counselling and health promotion services.<sup>31</sup>

We found only one significant association between sociodemographic predictors and pharmacists counselling approach around urine culture in recurrent UTIs. However, this issue is very important to provide the best care plan for patients with recurrent infections.<sup>32</sup>

This study has some limitations. The first limitation is related to the study design, whereby the cross-sectional design cannot confirm temporality and the cause effect relationship cannot be confirmed. The snowball sampling may have been associated with a risk of selection bias. However, this risk has been minimized as the study was conducted in all districts all over Lebanon. Moreover, the data collection was affected by COVID-19 pandemic, and we were not able to cover more pharmacies and have more face-to-face meetings with the pharmacists. Another limitation of the study is that it collected data through Google Forms; this approach may have excluded senior pharmacists who lack enough digital literacy to participate. Accordingly, the majority of our participants were young pharmacists with less than 5-10 years of experience. Hence, the generalizability of the findings is limited. Future work will involve senior and junior pharmacists to evaluate their knowledge and practices on UTIs, and assess the mediating role of seniority on the level of knowledge.

A study from the United Kingdom, aiming to identify opportunities to enhance the role of community pharmacists in the management of urinary tract infection (UTI), showed that community pharmacists play a daily role in controlling antimicrobial resistance by educating patients about viral and bacterial infections and promoting a healthy lifestyle.<sup>33</sup> Similar practice skills were obtained in that study and in our study.

#### Implications for practice

Although pharmacists all over the world play an important role in the management of different infections, including UTIs, they are still facing some difficulties that they must overcome to fulfil their career. Barriers to giving advice in the pharmacy were the lack of staff or time, the language barrier and the absence of access to patient medical records. Furthermore,



pharmacists must be trained and confident to give advice to patients with suspected UTIs.

Based on the associations between knowledge score and the pharmacists' demographics, it is advised that pharmacists frequently attend conferences and pursue post graduate degrees to maintain a better knowledge. As well being updated will provide pharmacists with a better attitude concerning the management of urinary tract infections. Finally, the results related to the practice of pharmacists amplifies the importance of keeping knowledge update for better practices, as well it shows that being more experienced will improve the quality of services provided by the pharmacists. In short, pharmacists must keep themselves up to date through updated guidelines and conferences in order to provide their patients with the most suitable therapy and treatment tips. Pharmacists must gain enough experience before taking the action of prescribing to prevent misuse or overuse of antibiotics.

## CONCLUSION

Community pharmacists are well positioned to take on a larger role in the management of UTI and can play an important role in primary care to improve the health outcomes of patients with UTI. Lebanese pharmacists are well knowledgeable about UTI and showed good attitude and practice in this field. However, only limited number of studies specifically assessed the knowledge, attitude and practice of pharmacist in providing patient counselling on urinary tract infection and its treatment. The results of our study, being the first of its kind, should trigger community pharmacists to keep themselves more

updated to provide further counselling tips and to follow the right treatment approaches to provide optimal care for their patients. This study provides insight for discussion with policy makers to upgrade legislation to enable pharmacists to legally prescribe antibiotics for uncomplicated UTIs, similar to other countries, to improve the patient care process and minimize the burden of the disease.

## AUTHOR CONTRIBUTIONS

The authors confirm contribution to the paper as follows: conceptualization: F.S. and M.D.; data curation: R.S. , F.S. and A.R; formal analysis: R.S. and F.S.; investigation: J.S. and M.A.; methodology: F.S., M.D., and D.M.; project administration: R.S., F.S. and M.D.; resources: D.M. and J.S.; software: R.S, F.S and A.R.; supervision: F.S.; visualization: J.S., M.A., and D.M.; writing original draft: R.S. ,F.S. and A.R; revision and editing it critically for important intellectual content: F.S., J.S., M.D., M.A., and D.M.; validation: F.S., M.D. and J.S. All authors reviewed the results and approved the final version of the manuscript.

## CONFLICTS OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

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