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Evidence-Based Practice among pharmacists in Northern Emirates and Fujairah: A Cross-sectional Survey

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Abstract

Background: Numerous studies had demonstrated the positive effects of applying the concept of evidence-based practice (EBP) in improving patient care and enhancing health-related outcomes.
Objectives: The study aimed to evaluate pharmacists' awareness, attitude and application of EBP in UAE, as well as to identify barriers thus propose possible improvements to its implementation in real clinical practice.
Design: An anonymous self-completed questionnaire was distributed to randomly selected pharmacists working in hospital and community pharmacies in Northern Emirates and Fujairah.
Results: The completed questionnaire was collected from 271 pharmacists, resembling a response rate of 83%. Findings revealed a positive attitude where 85% of participants found research studies to be useful in practice, and 90% agreed that EBP enhances patient care. Despite that, most participants showed an inadequate level of awareness, were only 5.2% had identified the correct components of evidence-based medicine (EBM), and 17% were familiar with the 12 terms commonly used in medical literature. Textbooks, google and Medscape were the most commonly used resources, in addition lack of time and patients demands were viewed as the main barriers to EBP. **Conclusion**: Pharmacists across the Northern Emirates and Fujairah revealed a positive attitude, yet lacked adequate understanding with respect to EBP components and terms. Hence, offering training, workshops as well as facilitating access to reliable resources can serve as useful solutions in refining the skills and practice of EBM in UAE.
Key words: Evidence-based practice, Critical appraisal, Pharmacists, UAE.

Impact on practice
Currently no information are available regarding EBP implementation among pharmacists in UAE. Where such data can help evaluate the status of pharmacy profession and therefore propose suitable strategies to improve the health system and patient care by identifying the actual gaps and obstacles that are hindering its practice.

INTRODUCTION

Current trends in the global health care system, towards a more patient-centered care, lead to the evolvement of many new disciplines especially in the field of pharmacy practice. All of which are focused on optimizing the patient's therapeutic outcomes and improving his quality of life. During the last decade, different fields exploited, in the constantly evolving domain of pharmacy, to fulfill such concepts, including clinical pharmacy, pharmaceutical care and medicine management. The key concept in achieving the goal to a more patient-centered pharmaceutical care is through the understanding and utilizing of evidence-based practice [1].

The concept of evidence-based practice (EBP) can be perceived as the ''responsible, explicit and wise use of recent best available evidence in making decisions concerning the care of an individual patient''. As a result, EBP utilizes the integration of the healthcare provider's clinical expertise and the patient's values with the best available research information, to make the most clinically sound decision, regarding that specific patient's health related needs [2]. The importance of implementing EBP lies in the fact that, a healthcare provider's clinical experience and professional opinion are not adequate to conclude the best clinical decision. As a result, a higher level of scientific evidence is needed to optimize the patient's outcomes. Such outcomes can be attained by means of high quality research studies. Which makes EBP the most accurate source for providing healthcare professionals with the most recent and reliable information they need to formulate their clinical judgement [3]. In addition, it is almost impossible for health professionals to stay updated with the numerous studies released every day. This is equally important for pharmacists as it is for other health care providers. Hence, utilizing EBP using systematic reviews and meta-analysis will guide pharmacists to optimize patients' therapeutic outcomes by choosing the most recent and cost-effective therapy for an individual patient, whilst minimizing any drug-related problem [4]. Another important aspect of applying EBP is the involvement of the patient in the decision process. By taking in consideration, patient's personal values and preferences in relation to his health needs. Which will optimize therapeutic outcomes by means of increasing patient's adherence and his concordance to the decision made [5].

In pharmacy, EBP is referred to as evidence-based pharmaceutical care (EBPC). Where it aims mainly at the contribution of the pharmacist to optimize the individual patient's pharmacotherapy and health outcomes, using high quality research [6]. In spite of its importance, such application of EBPC compels pharmacists to possess skills that can enable them to efficiently review the literature and critically appraise the different levels of research studies. Other barriers hindering pharmacists to practice EBPC, as mentioned by previous studies, include lack of time and

access to recourses, in addition to work overload [7]. Potential solutions suggested to overcome some of the barriers include, providing healthcare professionals with some personal protected time to review the literature, offering workshops and training to improve their skills, and allowing them access to reliable resources such as *The Cochrane Library* [8].

Since no study was performed to assess the level of EBP implementation among UAE pharmacists in their daily clinical encounters with patients, we found the need to evaluate their attitude, awareness and skills towards EBM and its related terms. Hence, we can estimate the extent of its practice, and therefore identify barriers as well as suggest potential solutions to address them.

METHODS

Study design and sample

A cross-sectional questionnaire-based survey, performed during the period from January through April of 2018. The total population of pharmacists according to the Ministry of Health and Prevention's latest data was 2,132 in the Northern Emirates and Fujairah [9]. Therefore, our sample size was estimated to include 326 pharmacists. Using a confidence Interval of 95% and a 5% margin of error. The sampling method used was a "proportionate stratified random sampling" procedure. The following inclusion criteria were considered: i) postgraduate pharmacists, ii) working at a hospital or a community pharmacy, either independent or chain, iii) from both government and private sectors. iv) There was no age, gender or nationality restrictions. v) In addition, no limited years of experience was required. Hence, the only pharmacists who were excluded from the study were i) undergraduate students, and those who are ii) working in Abu Dhabi, as well as Al Ain suburb. Besides iii) any pharmacist who do not wish to take part in the study.

Data collection tool

An anonymous self-completed questionnaire adopted from two previously validated surveys, designed to assess the pharmacists' knowledge, attitude and practice (KAP) towards EBP [10-11]. Several adjustments were done to some of the contents to match the study's local setting and population. The final form consisted of 19 questions, and was roughly estimated to takes from 5 to 10 minutes to be completed.

Besides the demographic data, the questionnaire evaluated the respondents' familiarity towards the components of EBM and its terms commonly used in the medical literature. The term of "relative odds ratio reduction", was included as a false "dummy" term [11]. Moreover, a familiarity score was calculated for each participant using the median score of all 12 terms. Attitude and practice scores were also formulated, in addition to a total KAP score.

Statistical analysis

Descriptive statistics were used to express the percentages, means, medians and standard deviations of categorical and discrete data respectively. Associations investigated included Mann-Whitney U test across several variables and participants' demographic data besides the independent-samples median test that was used to compare the scores of the participants. In addition to correlations, using the Spearman's coefficient, one-way ANOVA and regression analyses. Statistically significant results were quantified at $P < 0.05$ and 95% confidence interval. All tests were performed using IBM's "Statistical Package for Social Sciences" (SPSS) program version 23.

RESULTS

In total, the number of complete questionnaires collected was n=271. Resembling a response rate of 83%, according to our sample size of 326 pharmacists. The demographic information of participants are summarized in Table 1.

Table 1. Basic demographic information of participants.

Variables	**Total number of valid responses n (%)**		
Gender	271		
Male	128 (47.2)		
Female	143 (52.8)		
Ages (range)	22-51		
Median age	30		
Nationality			
UAE-national	5 (2)		
Arab	122 (48)		
Non-Arab	127 (50)		
Highest academic degree	175 (64.6)		
B.Pharm.	42 (15.5)		
Pharm.D.	43 (15.9)		
MS. Pharm.	2 (0.7)		
Ph.D.			
Years of experience			
<1 year	16 (5.9)		
1-5 years	123 (45.4)		
6-10 years	76 (28)		
>10 years	56 (20.7)		
Practice setting *	**Total**	**Male**	**Female**
Clinical pharmacy	8 (3)	0	8
Inpatient/IV-room pharmacy	8 (3)	2	6
Outpatient pharmacy	69 (25.5)	29	40
Community pharmacy	205 (75.6)	99	106
Others	11 (4.1)	4	7
Place of employment *			
Dubai	68 (25.1)		
Sharjah	118 (43.5)		
Ajman	35 (12.9)		
Ras Al-Khaimah	25 (9.2)		
Umm Al-Quwain	13 (4.8)		
Al Fujairah	21 (7.7)		

* *Multiple response question (values add up to >100%).*

Pharmacists' awareness towards EBP

Regarding the definition of EBM, participants had to select two other components, besides 'clinical experience'. Where only 14 pharmacists (5.2%) did recognize the correct two components of 'EBP resources' and 'patient choice'. Most

responders had guessed for the two answers of 'famous textbook' and 'EBP resources' with 53.4% (n=143) and 47.8% (n=128) respectively. While the option of 'patient choice' had ranked last with 20.9% (n=56) of cases.

The majority of pharmacists could identify 'systematic review' as the strongest type of study, according to the "hierarchy of evidence", with 62.8% (n=152). Participants who had more than 10 years of experience in their profession were more likely to identify systematic reviews as the strongest type of evidence with 73.3%, compared to others.

Concerning their familiarity with the medical literature terms, participants' were most aware of the terms EBM (41.9%), case-control study (38.3%) and number needed to treat (30.3%). Almost one third had declared to know the 'dummy term' of "relative odds ratio reduction", those pharmacists had achieved higher familiarity scores compare to their peers by (P<000). Most of our pharmacists found themselves unaware of the terms of odds ratio (47.7 %), null hypothesis/significance level (46.4%) and meta-analysis (43.4%). [Table 2]

A familiarity score was computed for each participant using the median value of all 12 terms. The mean of the total familiarity scores was 2.82, with a standard deviation of 0.562. Responders who assumed to understand all 12 terms resembled 16.97% (n=46). Overall, females assumed a higher familiarity level than males, with n=30 (65%) compared to n=16 (35%) males who had a median score of four.

The resources most commonly used by our participants to guide their clinical practice, were textbooks (27.6%), followed by google (21.2%), then Medscape (19.5%). Whereas the Cochrane library was the least utilized source of information with 1.7% [Figure 1]

Table 2. Participant's familiarity with the 12-EBM-related terms.

	I understand this and can explain it to others	I have a clue, but would like to know more	I have no clue at all, but would like to know more	I have no clue at all, and it has no relevance to me
Evidence-based medicine	113 (41.9 %)	109 (40.4 %)	45 (16.7 %)	3 (1.1 %)
Meta-analysis	49 (18.4 %)	93 (34.8 %)	116 (43.4 %)	9 (3.4 %)
Cohort study	57 (21.4 %)	102 (38.3 %)	94 (35.3 %)	13 (4.9 %)
Case-control study	103 (38.3 %)	111 (41.3 %)	49 (18.2 %)	6 (2.2 %)
Publication bias	68 (25.3 %)	114 (42.4 %)	78 (29 %)	9 (3.3 %)
Odds ratio	42 (15.9 %)	88 (33.3 %)	126 (47.7 %)	8 (3 %)
Relative risk	72 (26.9 %)	113 (42.2 %)	74 (27.6 %)	9 (3.4 %)
Absolute risk reduction	54 (20.3 %)	112 (42.1 %)	88 (33.1 %)	12 (4.5 %)
Relative risk reduction	63 (23.5 %)	102 (38.1 %)	94 (35.1 %)	9 (3.4 %)
Number needed to treat	81 (30.3 %)	86 (32.2 %)	95 (35.6 %)	5 (1.9 %)
Null hypothesis/ Significance level	49 (18.4 %)	76 (28.5 %)	124 (46.4 %)	18 (6.7 %)
Relative odds ratio reduction*	10 (3.7 %)	88 (32.8 %)	146 (54.5 %)	24 (9 %)

Dummy term

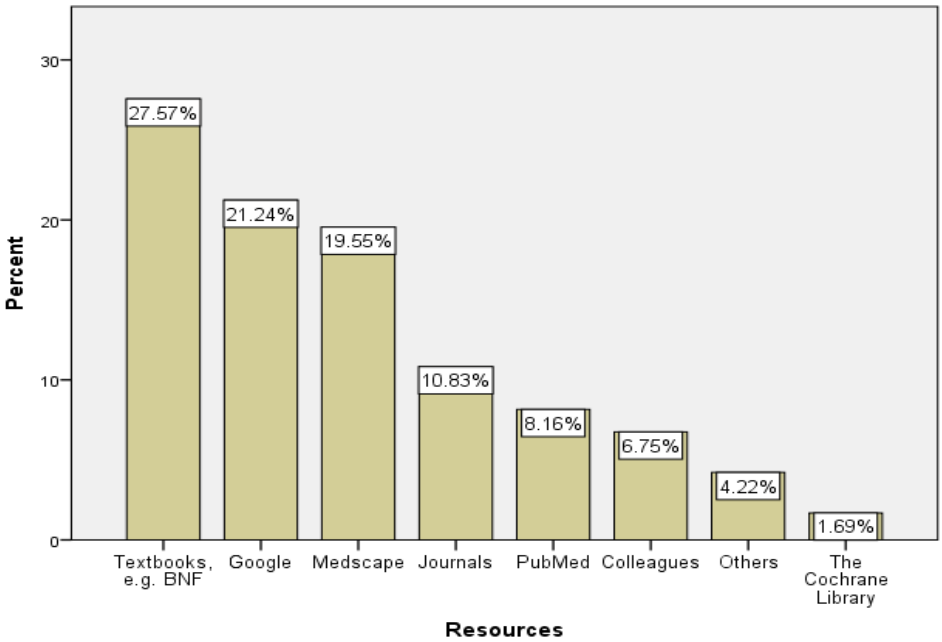

Figure 1. Bar chart of resources commonly used by pharmacists.

The participants were asked to assess their ability to perform some of the research appraising tasks, on a scale of 1 to 5, were one was considered as a very easy task and 5 a very difficult one with a neutral midpoint of 3. The skill of searching online was the easiest research-appraising task to most pharmacists, followed by applying evidence at clinical point of care. While sample size calculation was considered the hardest task together with handling statistics. [Table 3]

The chief obstacles to EBP that most pharmacists referred to were, 'too much evidence to go through during my limited time' by 21.6% (n=143), 'patients demand treatment despite lack of evidence for effectiveness' by 17.2% (n=114), and 'I don't have time to search for evidence' by 16.9% (n=112). [Figure 2]

Attitude of pharmacists towards EBP

The majority of pharmacists found research findings to be "useful" 59.4% (n=161) and "extremely useful" 25.5% (n=69), in their daily management of patients. Most of them also agreed that adopting EBP will improve patients care by 66.8% (n=181), in addition to a 25.1% (n=68) who had strongly agreed with the statement. Respondents' also believed that the application of EBP, however valuable as a model, will place another demand on already loaded pharmacists, via 45% (n=122). Overall, 42.4% (n=115) of the pharmacists agreed that EBP is of limited value in pharmacy because it lacks a scientific base. On the other hand, 28% (n=76) of participants, together with 8.5% (n=23) had disagreed and strongly disagreed with the statement.

Most participants had agreed that clinical experience was more important than the evidence with 48.3% (n=131). In contrast, the majority disagreed that patient desires are more important than evidence by 45.4% (n=123), while only 26.2% (n=71) of them agreed with the statement. Moreover, 53.1% (n=144) of responses agreed that the practical needs of work makes it difficult for pharmacists to stay updated with recent evidence related to their practice.

Despite the fact that the majority of participants agreed that it is the duty of every pharmacist to keep up-to-date with recent evidence by 66.4% (n=180), a minority of 3% (n=8) assumed to believe that it is not part of their responsibilities. Nearly all pharmacists assumed to have sufficient skills to undertake a comprehensive literature review by 73.1% (n=198), except a minority of 6.3% (n=17) that acknowledged to not possess the appropriate skills. Furthermore, the majority agreed to have facilities and resources to review the medical literature with 62.4% (n=169), despite a 15.9% (n=43) who disagreed to have the sufficient resources for such a purpose.

A total attitude score was computed using the total mean values of all ten-attitude questions. The total average of attitude scores of all participants was 3.41, with a range from 1 to 5, and a standard deviation of 0.406..

Table 3. The ability of participants to perform six of the research appraising tasks.

	Very Difficult % (n)	Difficult % (n)	Neutral % (n)	Easy % (n)	Very Easy % (n)
Skills of searching online	0.4 (1)	2.2 (6)	12.5 (34)	54.5 (147)	30.6 (83)
Evaluating study design	1.1 (3)	10.7 (29)	43 (116)	38.5 (104)	6.7 (18)
Assessing bias	2.2 (6)	21.6 (58)	50.9 (137)	21.9 (59)	3.3 (9)
Sample size calculation	3 (8)	28.3 (76)	34.6 (93)	29.4 (79)	4.8 (13)
Handling statistics	5.2 (14)	24.4 (66)	35.9 (79)	30.7 (83)	3.7 (10)
Applying evidence at clinical point of care	1.8 (5)	15.1 (41)	31.7 (86)	44.3 (120)	7 (19)

Table 4. Pharmacists' EBM daily practice across their demographic data.

	Frequency of EBM use in daily practice					
	Never	**Rarely**	**Sometimes**	**Often**	**Very Often**	**Total**
All responses	3 (1.1)	29 (10.7)	157 (57.9)	59 (21.8)	23 (8.5)	271 (100)
Gender Male	3 (2.3)	16 (12.5)	70 (54.7)	31 (24.2)	8 (6.3)	128 (100)
Female	0 (0)	13 (9.1)	87 (60.8)	28 (19.6)	15 (10.5)	143 (100)
Highest academic degree						
B.Pharm.	3 (1.7)	19 (10.9)	112 (64)	31 (17.7)	10 (5.7)	175 (100)
Pharm.D.	0 (0)	1 (2.4)	24 (57.1)	14 (33.3)	3 (7.2)	42 (100)
MS. Pharm.	0 (0)	8 (18.6)	11 (25.6)	14 (32.6)	10 (23.2)	43 (100)
Ph.D.	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	2 (100)
others	0 (0)	1 (11.1)	8 (88.9)	0 (0)	0 (0)	9 (100)
Years of experience						
<1 year	0 (0)	3 (18.8)	9 (56.2)	4 (25)	0 (0)	16 (100)
1-5 years	1 (0.8)	10 (8.1)	67 (54.5)	34 (27.7)	11 (8.9)	123 (100)
6-10 years	2 (2.6)	4 (5.3)	50 (65.8)	16 (21)	4 (5.3)	76 (100)
>10 years	0 (0)	12 (21.4)	31 (55.4)	5 (8.9)	8 (14.3)	56 (100)
Practice setting						
Clinical pharmacy	0 (0)	0 (0)	2 (25)	3 (37.5)	3 (37.5)	8 (100)
Inpatient pharmacy	0 (0)	0 (0)	4 (50)	2 (25)	2 (25)	8 (100)
Outpatient pharmacy	1 (1.5)	5 (7.2)	45 (65.2)	14 (20.3)	4 (5.8)	69 (100)
Community pharmacy	2 (1)	22 (10.7)	114 (55.6)	49 (23.9)	18 (8.8)	205 (100)

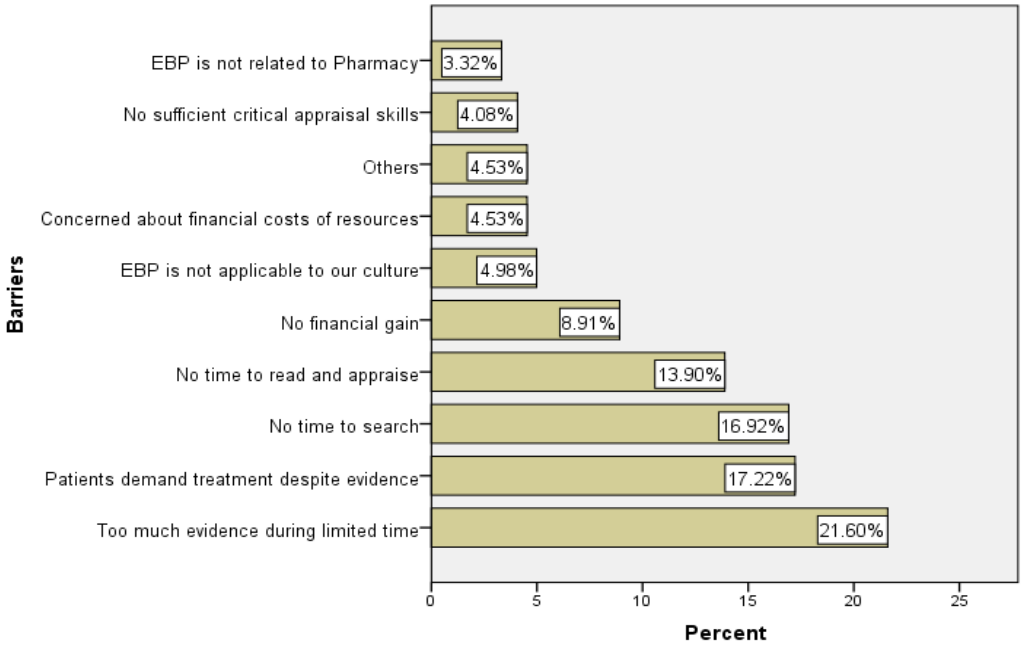

Figure 2. The major barriers to practicing EBM in pharmacy.

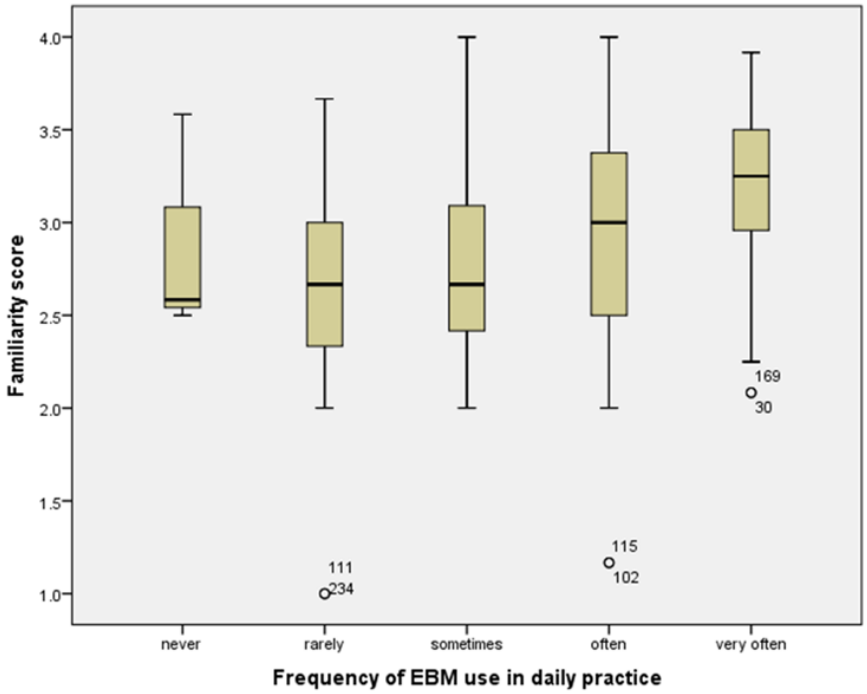

Figure 3. Boxplot of pharmacists' familiarity scores and EBM practice frequency.

Practice of EBP

Most participants considered the concept of EBP to be applicable to our culture by 44.3% (n=120), with the exception of 27.3% (n=74) of pharmacists who found it to be distinct from our local practices and values. When asked about their proceeding action if a recent evidence contradicts their clinical judgment, 5.5% (n=15) of pharmacists choose to discard the evidence and rely on their opinion, 34.7% (n=94) choose to follow the recent evidence, while the majority of 56.5% (n=153) preferred to evaluate the evidence.

In addition, pharmacists were evaluated in relation to their clinical practice of EBM and were asked to select the frequency of its application in their daily encounters with patients on a scale that ranged from 'very often', 'often', 'sometimes', 'rarely' and 'never'. Where the majority admitted to only 'sometimes' apply EBM in their daily practices by 57.9% (n=157). [Table 4]

A practice score was calculated using the mean of the EBM practice-related questions. The average of the total practice scores of pharmacists was 3, on a range of 1 to 5, and with a standard deviation of 0.514. Finally, a total 'KAP score' was computed using the means of participants' awareness, attitude and practice scores. The average of all KAP scores was 3.16, and a standard deviation of 0.378

DISCUSSION

To date this is the first cross-sectional study to evaluate the pharmacists' awareness, attitude and application of evidence-based practice in the UAE. The majority of our participants revealed a positive attitude towards the concept of EBM. Around 85% found research studies to be useful in their daily practice. In addition, nine out of ten pharmacists concurred the positive outcomes of EBP in enhancing patient care. These findings are consistent with similar studies performed in Saudi Arabia and Jordan, were pharmacists showed positive attitudes towards EBP by 75% and 80% respectively [7,10].

Despite their promising views, most of our participants exhibited a deficiency in relation to the concept and common terminologies of evidence-based medicine. Where only 5.2% of all responders were able to identify both correct components of EBM. Nearly half of the participants detected the component of "EBM resources", however, less than quarter were able to identify the component of "patient preferences". Comparable results across the Saudi hospital pharmacists showed that almost half yet only 1.7% of the participants had recognized the EBM components respectively [10].

In addition, participants' with higher academic degrees, as well as those working at clinical or inpatient settings, had a higher knowledge level of the EBM components compared to their peers. On the other hand, two third of the responders had recognized systematic reviews as the most reliable source of evidence, which again was positively related to the clinical and inpatient practice settings, as well as higher years of experience. Studies across pharmacists and family physicians from Saudi Arabia and Bahrain revealed similar findings, were only one third failed to identify systematic reviews as the strongest type of evidence [10, 12].

Concerning the pharmacists' familiarity with some of the terms that are frequently used in the medical literature. The term of evidence-based medicine was the most comprehended one across all twelve terms, despite the participants' failure to recognize its components. Whereas the terms of odds ratio, null hypothesis, significance level and meta-analysis were rated the least familiar ones. Comparable results among health professionals from Jordan and UK ranked odds ratio as the least familiar term, while Australian GPs were least aware of the terms meta-analysis and significance level. In contrast, the term of significance level was the most familiar to hospital physicians from Denmark [7-8, 11, 13].

Around 17% of our participants assumed to understand all twelve terms, among which females had constituted a greater portion, and thus assuming a higher awareness level than males. Besides, one third of our pharmacists claimed to be familiar with the dummy term of "Relative odds ratio reduction". Participants who declared knowing the dummy term, had significantly higher familiarity scores than their peers who denied to be aware of it (P<000). The findings are consistent, though to a lower extent, with physicians from Denmark who declared knowing the dummy term by more than 50% [11].

In spite of their positive attitude, almost half of our participants acknowledged that the application of EBP, however valuable as a model, would place another demand on already loaded pharmacists, and that it would be of limited value in pharmacy profession as it lacks a scientific base. In addition, two third of the responders believed that clinical experience was more valuable than research evidence, yet the evidence was more important than patient desires. Although, nine out of ten pharmacist declared that it is the duty of every professional to keep updated with recent research findings, more than half of them found it inapplicable in view of their workloads, which was consistent with the UK study across primary care professionals [8]. Overall, females showed a significantly more positive attitude towards EBP in our study than males (P=0.002).

Around three fourth of responders believed to have the sufficient skills and resources to undertake a comprehensive literature review. Their easiest literature appraising abilities were the skills of searching on-line and applying the research findings at the point of care. While the trickiest skills were, dealing with statistics along with sample size calculations. These findings contradicts the ones from a UAE study across undergraduate pharmacists who found the skills of searching on-line and evidence application at point of care among the harder ones [14]. Moreover, participants holding a higher academic degree had significantly greater familiarity and skills levels with P-values of 0.003 and 0.006 respectively.

The majority of pharmacists considered the concept of evidence-based practice to be applicable to our local culture, with the exception of 31.2%. Similarly, about one third of professionals from each of Bahrain, Jordan and Saudi Arabia revealed comparable views [7, 10, 12]. More than half of our responders had decided to evaluate the evidence that contradicts their clinical judgement.

In addition, nine out of ten pharmacist presumed to practice EBM with a rate of 'sometimes' and 'often' (2/3 and 1/3 respectively) during their daily encounters with patients. A higher rate of EBM practice was associated with a significantly higher familiarity score (P=0.023) [Figure 3]. Such rate of EBM practice was much higher than other studies were two third of professionals from Bahrain and UK declared their practice to be evidence-based, compared to three fourth of the professionals from Australia and Saudi Arabia [8, 10, 12-13].

Most of our participants relied on textbooks, google and Medscape as their primary sources of information, with only a minority of 4.4% who mentioned using the Cochrane Library. In contrast, only 4.2% of all pharmacists who declared to practice EBM 'often' had used the Cochrane

library. Besides, three fourth of the Cochrane Library users were also PubMed users, as well as two third of them were less likely to rely on textbooks as their source of evidence. Furthermore, both users of the Cochrane Library and PubMed held relatively higher academic degrees, and scored a significantly higher median familiarity scores compared to textbook users (P=0.004 and P<000 respectively). Healthcare professionals from Denmark, Australia, Jordan and Qatar also admitted using textbooks and the internet as their chief resources of information [7, 11, 13, 15]. On the other hand, hospital pharmacists from Saudi Arabia were frequent users of PubMed and Up-to-date [10].

The barriers towards effective application of EBP in our pharmacists' opinions were mainly about the scarcity of 'time', where the majority mentioned lacking personal time to search and get through the numerous available research findings. In addition, patient desires and wants for specific treatments regardless of their usefulness, was believed by most participants to be another major obstacle. Once again the findings are consistent with most related studies across the globe revealing "lack of time" to be the main hurdle to EBM implementation among healthcare professionals. Respectively "patient demands" was declared an important barrier among Australian general practitioners [13].

In particular, pharmacists with masters of pharmacy degrees had a significantly higher KAP scores compared to B.Pharm and Pharm.D holders (P<000). In addition, clinical pharmacists revealed a significantly higher KAP scores compared to their colleagues at other practice settings (P=0.039). Similar correlation was cited among hospital physicians and pharmacists from Denmark and Saudi Arabia respectively, where the participants' familiarity scores were positively related to their highest academic degrees [10-11].

CONCLUSION

Pharmacists across the Northern Emirates and Fujairah revealed a positive attitude towards the concept of evidence-based practice. Where the majority found research studies to be useful in their daily practice, and that the application of EBM enhances patient care. Regardless of their positive views, most participants showed an inadequate level of awareness in relation to the concept and common terminologies of evidence-based medicine.

Most of the pharmacists believed to have the sufficient skills and resources to undertake a comprehensive literature review. Although the majority acknowledged that the concept of EBP is applicable to our culture, participants found it impossible to practice along with their work overload. The primary sources of information frequently used by the participants were textbooks, google and Medscape, while the Cochrane Library ranked the last. Most of the pharmacists believed that lack of personal time and patients' demands were the main barriers to EBM implementation in real practice.

These findings necessitate the need for formulating national strategies to promote the concept of EBP in our culture. In addition, providing training, workshops as well as facilitating access to reliable resources to pharmacists and other healthcare professionals, can serve as useful solutions in refining the skills and practice of EBM in the United Arab Emirates.

Limitations

The current study experienced some drawbacks, as the results were based upon the participants' own evaluations concerning their awareness, attitude and practice levels of EBM. Were some pharmacists might have felt reluctant to reveal any weakness in their knowledge or practice, which might have caused an overestimation of the study findings.

Future research

Future studies with a larger sample size and over a longer period are needed to follow-up and assess the actual implementation of the concept in practice.

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