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ORIGINAL RESEARCH article

Beyond self-assessment: Understanding Libyan pharmacists' confidence and barriers to conducting pharmacy practice research

Hiba A. Alshami [1 *], Maryam S. E. Hussein [1], Abdulrahman Alshwehdi [2], Eman Benhalim [2], Shaima Bukar [2], Hanin F. Hussin [3], Ghada Awad [2] and **Usman Abubakar [4]**

[1] Anaesthesia and Emergency Medicine Department, Faculty of Medical Technology, Benghazi, Libya
[2] Faculty of Pharmacy, Libyan International Medical University, Benghazi, Libya
[3] Department of Pharmacology and Toxicology, Faculty of Pharmacy, University of Benghazi, Benghazi, Libya
[4] Department of Clinical Pharmacy and Practice, College of Pharmacy, QU Health, Qatar University, Doha, Qatar
[*] Author to whom correspondence should be addressed

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Abstract: Recent studies have shown that pharmacists have an interest in conducting research. However, barriers such as lack of confidence prevent pharmacists from participating in ruling research. This study evaluated pharmacists' self-perceived competence and confidence scores for health-related research. A validated self-designed questionnaire was distributed to randomly recruited Libyan pharmacists in hospitals and community pharmacies. Both descriptive and inferential statistical analyses were applied to the data. The analysis included 191 responses. Most respondents had prior research experience (67.0%). Over two-thirds (72.3%) rated their ability to conduct health-related research as good to excellent. The majority had not published articles in peer-reviewed journals in the past five years (71.2%) and had no abstracts or posters published at local/regional (65.4%) or international conferences (79.1%). Lack of support (55.5%) was the most common barrier to participating in health-related research, followed by lack of funds (42.9%), time (29.3%), and knowledge (26.2%). At least two-thirds of pharmacists felt somewhat competent or confident in conceptualizing research ideas, collecting data, managing and storing data, and preparing presentations. Less than 60% felt competent /confident in outlining statistical plans and using statistical software. Overall, pharmacists displayed moderate competence (median score=38.0/65) and confidence (median score=40/65) in planning and conducting health-related research. Those with prior research experience (median score=42.0 vs. 29.0) and training (median score=41.0 vs. 28.0) had significantly higher scores. Higher scores were also noted among those who had published in peer-reviewed journals (median score=46.0 vs. 37.0) and presented at regional/local conferences (median score=46.5 vs. 34.0). Most pharmacists in Libya were interested in conducting research, and the majority of them had previous research experience and previous research-related training. The pharmacists had moderate competence and confidence to plan and conduct research. Research training was recommended for practicing pharmacists and pharmacy students to improve pharmacists' research involvement and promote the advancement of pharmacy practice in Libya.

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Introduction

Pharmacy research is a vast field encompassing the science behind medications and their real-world use. It includes the development and evaluation of medications (drug formulation, dosage forms, stability studies, methods of assay, and standardization) as well as the social, behavioural, and economic factors that influence medication use in populations. Recently, there has been a concerted effort to focus on developing not only the concept of research but also pharmacy services used worldwide. To achieve this, researchers must possess the knowledge and skills essential for collecting useful data, writing proper discussions and conclusions, and publishing scientific reports or articles [1]. Recognizing the importance of research alongside other crucial pharmacist roles, the World Health Organization (WHO) introduced the concept of the "seven-star pharmacist" in 1997. This concept highlights the diverse functions pharmacists fulfill, including caregivers, decision-makers, communicators, managers, lifelong learners, teachers, and leaders [2]. Recently, "researcher" and "entrepreneur" have been added, creating the "nine-star pharmacist," further emphasizing the significance of research in both professional practice and academic settings.

In recent decades, pharmacists have played a crucial role in research aimed at improving medication efficacy and patient outcomes. This research encompasses reducing adverse effects, developing new knowledge, and exploring new drug synthesis strategies. Selecting appropriate methodologies is critical for generating high-quality data and evidence, and research projects in health services and pharmacy practice may require utilizing multiple methods [3]. Pharmacists must recognize that a single method cannot address all research questions. Despite the growing importance of research, pharmacists in several countries, including Nigeria, Saudi Arabia, Jordan, and Iran, face obstacles that impede their involvement. These challenges include a lack of time and job support, insufficient research experience and training, limited financial resources, and inadequate mentorship [3]. Developing skills like leadership, teamwork, and continuous learning is crucial for a successful pharmacy career. Pharmacy services have been evolving, with community pharmacies becoming an area of increased focus for research. This continuous professional development of pharmacists helps support an evolving healthcare system [3-5]. Many pharmacists worldwide may feel inadequately prepared for research due to factors like a lack of confidence, fear of new experiences, and limited mentorship. There were no studies have assessed the situation of Libyan pharmacists. This study aims to address this gap by assessing: the level of self-perceived competence of Libyan pharmacists in research, the level of self-confidence Libyan pharmacists have in their ability to plan, conduct, and disseminate research, the specific barriers and challenges that hinder Libyan pharmacists' participation in health-related research, and finally, how self-perceived competence and confidence vary across different demographics. By investigating these areas, this research can provide valuable insights into the unique situation of Libyan pharmacists and inform strategies to improve their research participation.

Materials and methods

Study design: A cross-sectional study was conducted among Libyan pharmacists using a 74-item piloted questionnaire (self-administered) distributed among hospital and community pharmacists in Libya between November the 19th 2022 and February the 19th 2023.

Ethics approval and consent to participate: Ethics approval was obtained from the Libyan International Medical University (LIMU) ethical committee (Project LIMU ID no. 4-G-00029), Certificate Reference N0: PHR-2023-00018, Benghazi, Libya. The respondents are allowed to submit only one response, informed that the participation in the study was voluntary, and assured that responses were anonymous and their information is confidential. The respondents were notified that their submission of responses was considered as consent to participate in the survey.

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ISSN: 2958-3101 print

Inclusion and exclusion criteria: Any pharmacists registered in the pharmacist's syndicate, working in community pharmacies, or hospital pharmacies who agreed to participate were included in this study. Specialties other than pharmacy like medicine and dentistry were excluded to participate in this study.

Instrument for data collection: The online questionnaire used for this study was adopted based on a previous study [1]. Permission to use the survey was obtained from the corresponding author. The questionnaire was modified to suit the Libyan setting. The adapted questionnaire was validated by three pharmacists. Finally, the questionnaire consists of 74 items and six sections (demographic, research interest, barriers to conducting research, self-assessment of competence and confidence to conduct research, and postgraduate training interest).

Data collection: The questionnaire was distributed between November 2022 and February 2023. The study's researcher shared the hyperlink to the electronic survey with the community pharmacists and hospital pharmacists. Also, eligible pharmacists were invited to take part in this survey using social media invitations like Messenger, WhatsApp, and Telegram. After a few days, a reminder was sent to the targeted respondents who did not respond. The responses in the competence and confidence of pharmacists to plan and conduct pharmacy practice research were transformed into scores from 5 (extremely competent/very confident) to 1 (strongly not competent/ confident at all).

Statistical analysis: Data were analyzed using IBM SPSS®, version 20, and were presented as frequencies with percentages and mean; respectively. The normality of the continuous data was tested using the Kolmogorov-Smirnov test. The responses in the competence and confidence of pharmacists to plan and conduct pharmacy practice research were transformed into scores from 5 to 1. The mean score for each item in the competence and confidence domain was calculated using the scores. Student t-test was used to compare the mean scores between pharmacists and those without previous research experience. The mean scores of items in the research competence and confidence domains were ranked to determine the lowest and the highest scores. This was used to identify specific research skills. Participants were most and least competent or confident to undertake, respectively. P-values lower than 0.05 were considered statistically significant. In addition, logistic regression analysis was used to determine factors that predict moderate-to-extreme self-competence and confidence scores. First, the overall competence and confidence scores were categorized into two groups: 3-5 points were labeled as moderate-to-extreme self-competence and confidence while scores below 3 were defined as not competent and confident. The independent variables were transformed into dichotomous variables as follows; 1 and 0 for presence and absence of characteristics of interest; respectively.

Results

Demographic characteristics of the respondents: **Table 1** summarizes the demographic characteristics of the pharmacists who participated in the study. Thus, a total of 191 pharmacists completed the questionnaire. Most of the respondents were female subjects (70.7%), 49.7% aged 31-40 years, and 49.7% had 1-5 years working experience. Community (40.8%) and hospital (35.6%) pharmacists accounted for more than two-thirds of the respondents.

Previous research experience and training among pharmacists: **Table 2** shows the previous research experience and training among the respondents. 67.0% of the respondents had previous research experience and 28.8% of them had previous research-related training from undergraduate, 17.8% workshop, and 11.5% postgraduate training. 72.3% rated themselves as having a good to excellent overall ability to conduct health-related research. 71.2% of the respondents had no articles published in a peer-reviewed journal within the last 5 years. Similarly, 65.4% of the respondents had no abstract or poster published in either a local/regional conference or an international conference (79.1%).

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Table 1: Demographic characteristics of the respondents

Variable	Frequency (%), n=191
Gender	
Male	55 (28.8)
Female	135 (70.7)
Age in years	
21-30	84 (44.0)
31- 40	95 (49.7)
41-50	10 (5.2)
> 50	02 (1.0)
Highest degree*	
Bachelor of Pharmacy	141 (74)
Doctor of Pharmacy	19 (10)
Masters	19 (10)
PhD	5 (2.5)
Diploma	04 (02)
City of practicing*	
Benghazi and districts	151 (79)
Derna and districts	23 (12)
Tripoli and districts	11 (06)
Misurata and districts	02 (01)
Others	01 (0.5)
Area of practice	
Hospital	68 (35.6)
Community	78 (40.8)
Academic	27 (14.1)
Administration	13 (6.8)
Industry	04 (2.1)
Years of experience	
1-5 years	95 (49.7)
6-10 years	47 (24.6)
11-15 years	36 (18.8)
> 15 years	10 (5.2)

***Missing data=3**

Table 2: Research background and interest of the respondents in conducting health-related research

Variable	Frequency (%), n=191
Previous research experience	
Yes	128 (67.0)
No	63 (33.0)
Previous research-related training	
No training	57 (29.8)
Workshop	34 (17.8)
Seminar	13 (6.8)
Short course	10 (5.2)
Undergraduate training	55 (28.8)
Postgraduate training	22 (11.5)
Interest in conducting health-related research	
Not interested at all	14 (7.3)
Not very interested	28 (14.7)
Somewhat interested	60 (31.4)
Very interested	55 (28.8)
Extremely interested	33 (17.3)
Overall ability to design and conduct health-related research	
Poor	21 (11.0)
Fair	32 (16.8)
Good	92 (48.2)
Very good	34 (17.8)
Excellent	12 (6.3)

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ISSN: 2958-3101 print

Involvement in research as a subject or a respondent	
Never	64 (33.5)
Sometimes	66 (34.6)
Often	20 (10.5)
Usual	29 (15.2)
Always	12 (6.3)
Number of peer-reviewed journal articles published within the last 5 years	
0	136 (71.2)
1-3	46 (24.1)
> 4	06 (3.1)
Number of peer-reviewed posters and/or abstracts in local/regional conferences in the last 5 years	
0	125 (65.4)
1-3	50 (26.2)
> 4	13 (6.8)
Number of peer-reviewed posters and/or abstracts in international conferences in the last 5 years	
0	151 (79.1)
1-3	27 (14.1)
> 4	08 (4.2)

Barriers to pharmacists' participation in health-related research: **Table 3** describes the barriers to pharmacists' participation in health-related research. The respondents indicated that lack of job support was the most common barrier that limited their participation in health-related research (55.5%). This was followed by lack of funds (42.9%), lack of time (29.3%), and inadequate knowledge (26.2%).

Table 3: Barriers to pharmacist participation in health-related research

Barrier	Frequency (%), n=191
Lack of funds	82 (42.9)
Lack of job support	106 (55.5)
Lack of time	56 (29.3)
Inadequate knowledge	50 (26.2)
Lack of interest	11 (5.8)
No barrier	02 (1.0)

Competence and confidence of pharmacists to plan and conduct health-related research: **Table 4** shows the competence and confidence responses of the pharmacists to plan and conduct health-related research. At least two-thirds of the pharmacists indicated that they were somewhat competent/confident to extremely competent/confident in the conception of the research idea, collecting relevant data using pre-planned data collection forms managing and storing data entry into a database, and preparing a presentation (oral or poster). Less than two-thirds (<60%) were somewhat competent/confident to extremely competent/confident in outlining detailed statistical plans to be used in data analyses, and choosing and applying statistical analyses using software (e.g. STATA, SPSS, Epi Info). Overall, the pharmacists were found to have moderate competence (38 out of 65) and confidence (40 out of 65) to plan and conduct health-related research.

Differences in the competence and confidence to conduct health-related research among the respondents: **Table 5** summarizes the differences in the competence and confidence score according to the characteristics of the participants. There were no significant differences in the competence and confidence scores based on age, gender, educational qualification, and area of practice between the respondents. Those with previous research experience (42.0 versus 29.0) and those with previous research-related training (41.0 [1-65] versus 28.0 [14-56]) had significantly higher competence and confidence scores. In addition, higher competence and confidence score was observed among those who had published a peer-reviewed journal article (46.0 [1-65] versus 37.0 [2-60]) and an abstract/poster in a regional/local conference (46.5 [1-64] versus 34.0 [2-65]).

ISSN: 2789-1895 online
ISSN: 2958-3101 print

Table 4: Competence and confidence of the respondents to conduct health-related research

Competence domain	1.0	2.0	3.0	4.0	5.0	Median score
The conception of a research idea	16 (8.4)	44 (23.0)	61 (31.9)	44 (23.0)	22 (11.5)	3.0 (0-5)
Writing research proposals including hypotheses, research questions, study designs, and methods	32 (16.8)	42 (22.0)	53 (27.7)	40 (20.9)	19 (9.9)	3.0 (0-5)
Searching and reviewing the literature efficiently	38 (19.9)	42 (22.0)	46 (24.1)	46 (24.1)	18 (9.4)	3.0 (0-5)
Defining target population, sample, and eligibility criteria and choosing an appropriate sampling technique (e.g. random sampling)	27 (14.1)	42 (22.0)	48 (25.1)	52 (27.2)	21 (11.0)	3.0 (0-5)
Determine the appropriate sample size	30 (15.7)	40 (20.9)	55 (28.8)	47 (24.6)	15 (7.9)	3.0 (0-5)
Determining outcome measures (variables to measure)	33 (17.3)	43 (22.5)	52 (27.2)	45 (23.6)	15 (7.9)	3.0 (0-5)
Outlining detailed statistical plans to be used in data analyses	40 (20.9)	48 (25.1)	53 (27.7)	40 (20.9)	7 (3.7)	3.0 (0-5)
Development, designing, and validation of data collection form (e.g. questionnaire	29 (15.2)	39 (20.4)	54 (28.3)	54 (28.3)	12 (6.3)	3.0 (0-5)
Collecting relevant data using pre-planned data collection forms and managing and storing data entry into a database	25 (13.1)	33 (17.3)	57 (29.8)	52 (27.2)	18 (9.4)	3.0 (0-5)
Choosing and applying Statistical analyses using software (e.g. STATA, SPSS, Epi Info)	49 (25.7)	51 (26.7)	35 (18.3)	37 (19.4)	15 (7.9)	2.0 (0-5)
Summarizing data in tables or charts and interpretation of the findings and determining the significance of obtained results	27 (14.1)	42 (22.0)	45 (23.6)	49 (25.7)	21 (11.0)	3.0 (0-5)
Preparing a presentation (oral or poster)	15 (7.9)	27 (14.1)	41 (21.5)	55 (28.8)	47 (24.6)	4.0 (0-5)
Writing a manuscript for publication in a scientific journal	33 (17.3)	45 (23.6)	41 (21.5)	42 (22.0)	25 (13.1)	3.0 (0-5)
Median total competence score: 38 (1-65)						
Confidence domain						
The conception of a research idea	14 (7.3)	29 (15.2)	52 (27.2)	59 (30.9)	31 (16.2)	3.0 (0-5)
Searching and reviewing the literature efficiently	20 (10.5)	32 (16.8)	54 (28.3)	57 (29.8)	20 (10.5)	3.0 (0-5)
Writing research proposals including hypotheses, research questions, study designs, and methods	18 (9.4)	37 (19.4)	50 (26.2)	60 (31.4)	19 (9.9)	3.0 (0-5)
Defining target population, sample, and eligibility criteria and choosing an appropriate sampling technique (e.g. random sampling)	20 (10.5)	32 (16.8)	53 (27.7)	57 (29.8)	22 (11.5)	3.0 (0-5)
Determine the appropriate sample size	22 (11.5)	36 (18.8)	56 (29.3)	51 (26.7)	20 (10.5)	3.0 (0-5)
Determining outcome measures (variables to measure)	21 (11.0)	40 (20.9)	60 (31.4)	48 (25.1)	16 (8.4)	3.0 (0-5)
Outlining detailed statistical plans to be used in data analyses	27 (14.1)	45 (23.6)	60 (31.4)	37 (19.4)	14 (7.3)	3.0 (0-5)
Development, designing, and validation of data collection form (e.g. questionnaire	24 (12.6)	32 (16.8)	57 (29.8)	52 (27.2)	20 (10.5)	3.0 (0-5)
Collecting relevant data using pre-planned data collection forms and managing and storing data entry into a database	17 (8.9)	41 (21.5)	54 (28.3)	48 (25.1)	24 (12.6)	3.0 (0-5)
Choosing and applying Statistical analyses using software (e.g. STATA, SPSS, Epi Info)	40 (20.9)	37 (19.4)	48 (25.1)	37 (19.4)	21 (11.0)	3.0 (0-5)
Summarizing data in tables or charts and interpretation of the findings and determining the significance of obtained results	23 (12.0)	34 (17.8)	59 (30.9)	40 (20.9)	29 (15.2)	3.0 (0-5)
Preparing a presentation (oral or poster)	12 (6.3)	27 (14.1)	55 (28.8)	46 (24.1)	44 (23.0)	3.0 (0-5)
Writing a manuscript for publication in a scientific journal	31 (16.2)	36 (18.8)	44 (23.0)	46 (24.1)	28 (14.7)	3.0 (0-5)
Median total confidence score: 40 (0-65)						

A survey of pharmacists found that most of them were interested in pursuing postgraduate training. The most popular option was a Master's program, with 63% of pharmacists expressing interest in this degree. Diploma programs and Doctor of Philosophy (PhD) were also popular, with 30% and 20% of pharmacists interested in

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these options, respectively. Within the discipline of clinical pharmacy and practice, the most popular areas of interest were pharmacoepidemiology and drug safety (50%), direct patient care (43%), and pharmacotherapeutics research (42%). Other areas of interest included clinical outcome research (34%), pharmacoeconomics (23%), and social and behavioral aspects of life (21%) as shown in **Table 6**.

Table 5: Differences in competence and confidence to plan and conduct health-related research among pharmacists

Variable	Median competence score	P value	Median confidence score	P value
Gender				
Male	38 (1-64)	0.624	39 (0-65)	0.475
Female	39 (13-65)		41.5 (0-65)	
Age in years				
21-30	40.0 (1-65)	0.100	41.5 (0-65)	0.126
31-40	39.0 (12-56)		40.5 (0-65)	
41-50	33.0 (15-47)		32.0 (14-63)	
> 50	23.5 (19-28)		23.0 (18-28)	
Highest degree				
Bachelor of Pharmacy	38.0 (13-65)	0.217	40.0 (0-65)	0.990
Postgraduate degree	42 (1-64)		41.0 (0-65)	
Previous research experience				
Yes	42.0 (1-65)	**<0.001**	43.0 (0-65)	**<0.001**
No	29 (12-56)		31.0 (0-63)	
Previous research-related training				
Yes	41.0 (1-65)	**<0.001**	43.0 (0-65)	**0.002**
No	28.0 (14-56)		31.5 (0-57)	
Involvement in research as a subject or a respondent				
Yes	40.0 (1-65)	**<0.001**	40.5 (0-65)	**<0.001**
No	31.0 (14-57)		32.0 (0-65)	
Publish a peer-reviewed journal article within the last 5 years				
Yes	46.0 (1-65)	**0.001**	46.0 (0-65)	**0.003**
No	37.0 (2-60)		39.0 (2-65)	
Publish peer-reviewed posters/abstracts in local/ regional conferences in the last 5 years				
Yes	46.5 (1-64)	**<0.001**	46.0 (0-65)	**<0.001**
No	34.0 (2-65)		39.0 (0-65)	
Publish peer-reviewed posters/abstracts in international conferences in the last 5 years				
Yes	41.5 (1-64)	0.122	43.0 (0-65)	0.395
No	38.0 (2-65)		39.0 (0-65)	

Table 6: Pharmacists interest in post-graduate education and their area of interest

Variable	Frequency (%), n=191
Interest in postgraduate studies [a]	
Not interested	17 (09)
Masters	121 (63)
Residency/fellowship	16 (08)
PHD	38 (20)
Diploma	57 (30)
Area of interest in clinical pharmacy and practice	
Pharmacoepidemiology and drug safety	59 (50)
Pharmacotherapeutics research	80 (42)
Pharmacoeconomics	44 (23)
Social and behavioral aspects of life	40 (21)
Clinical outcome research	65 (34)
Direct patient care	82 (43)

a = 2 missing data

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Discussion

The current study investigated the competence and confidence of practicing pharmacists to plan and conduct health-related research. The findings showed that more than two-thirds of the participants were interested in conducting health-related research and this is in agreement with the findings of previous studies conducted in the UK, Australia, Canada, Scottland, and GCC countries (i.e., Saudi Arabia, United Arab Emirates, Kuwait, Bahrain, Oman and Qatar) [6-8]. Evidence has shown that practicing pharmacists acknowledge the importance of research in advancing pharmacy practice [1]. Most of the pharmacists had previous research experience and previous research-related training, and this was consistent with the findings from Nigeria [9] and a multinational study [8], and 36% higher than the findings reported in Qatar [10] and Saudi Arabia [11]. The variations could be attributed to the differences in the time of the study, and undergraduate, and postgraduate research training opportunities available to practicing pharmacists and pharmacy students [12-14]. Research outcomes including manuscripts and abstracts publications were low among the pharmacists involved in the study. Previous studies have demonstrated that less than one-third of practicing pharmacists have published research manuscripts or research abstracts [7, 9, 10]. This reflects a low research involvement among practicing pharmacists and could be attributed to some barriers including a lack of job support, funding, time, and knowledge. These barriers have been reported as common barriers to pharmacists' involvement in pharmacy practice research [6, 9, 10]. Considering the importance of research to the advancement of pharmacy practice, interventions to promote pharmacists' participation in research were recommended [7]. Early research experience and participation especially during undergraduate training should be encouraged. Available evidence has shown the impact of research in pharmacy courses in improving the research competence and confidence of undergraduate pharmacy students [1, 15].

It was found that about two-thirds of pharmacists were competent/confident in the conception of research ideas, data collection and entry into a database, and preparing a presentation (oral or poster). It was lower than the results presented in previous studies conducted in Saudi Arabia and Nigeria [9, 10]. In contrast, the pharmacists were found to have low competence and confidence in outlining statistical plans for data analyses and selecting appropriate statistical analyses using software (e.g., STATA, SPSS, Epi Info). It was consistent with the findings of previous studies conducted in the Gulf Cooperation Council and Nigeria [8-10]. It highlights the need to reform the mandatory undergraduate and postgraduate research courses and ensure the quality of them to achieve the intended goals and to prepare future pharmacists for involvement in health-related research activities. In addition, seminars and workshops should be provided to practicing pharmacists as part of the continuing professional development program to enhance their research knowledge and skills. Overall, practicing pharmacists were found to have moderate competence and moderate confidence in planning and conducting health-related research despite the high rate of previous research experience among pharmacists. Therefore, both didactic and experiential research training are recommended to address research statistics and analysis deficiency among pharmacists.

The current study also revealed that pharmacists with previous research experience, those with previous research-related training, those with frequent research involvement as respondents, and those with previous research publication experience, were found to have better competence and confidence scores compared to those who do not. These results aligned with the findings of previous studies [8, 9], and the findings support the impact of a research course on the competence and confidence of pharmacy students to plan and conduct research [1, 15]. A study conducted in Qatar revealed that more than 50% of practicing pharmacists and final-year pharmacy students with previous research-related training have published at least one article in peer-reviewed journals [16]. The current study showed that there was no significant difference in the competence and confidence score between pharmacists and those without postgraduate qualifications, and it was in contrast to the result of previous studies [7, 10]. The difference could be explained by variations in the content of the

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training curricula between Libya and other countries, and the inconsistency in the percentage of pharmacists with postgraduate education between the studies. The findings of the current study underline the importance of providing mandatory research-related training and research-related project experience in undergraduate and postgraduate pharmacy training curricula. In addition, dissemination of research findings through article publication and poster presentation should be encouraged to prepare pharmacy students for future research involvement.

Conclusion: Most pharmacists in Libya are interested in conducting research, and about two-thirds of them have previous research experience and previous research-related training. The pharmacists have moderate competence and confidence to plan and conduct research with higher scores observed among those with previous research experience, those with previous research-related training, those with research publication experience, and those with frequent research involvement as respondents/subjects. Research training is recommended for practicing pharmacists and pharmacy students to improve pharmacists' research involvement and promote the advancement of pharmacy practice in Libya.

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