


# Perception of Pharmacists about Scientific Publications in Saudi Arabia

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**ABSTRACT**

**Objectives:** In this study, we aimed to explore the perception of pharmacists about scientific publications in the Kingdom of Saudi Arabia. **Methods:** This is a cross-sectional study conducted to explore the perception of pharmacists about scientific publications in Saudi Arabia. We used a self-reported electronic survey questionnaire and distributed it to interns to consultants, and pharmacy specialists in Saudi Arabia. The survey collected demographic information of the responders, their perception of scientific publications, and barriers preventing them from participating in pharmacy scientific publications. In addition, we requested their suggestions on how to stimulate their interest in pharmacy publications. We used 5-point Likert response scale system with close-ended questions to obtain responses. The data were collected through the Survey Monkey system and analyzed with the Statistical Package of Social Sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel (version 16) software. **Results:** The average score for the perception of pharmacists about scientific publications was 3.74. The highest score (3.33) was obtained for the element "the pharmacist understands the pharmacy publication and pharmacy publications terminology." The score for the element "pharmacist believes that pharmacy publications are essential for the pharmacist" was (3.97). According to our results, the pharmacists are interested in working on a pharmacy publications project. The average score for the barriers that prevent pharmacists from participating in pharmacy scientific publication was (3.76). The high score for the element "the pharmacist believes that the daily activities prevent me from doing pharmacy publication as there is lack of interest and motivation" was 3.88. The score for the element "pharmacist considers that pharmacy publications are essential for the pharmacist" was (3.85). The average score for the element "suggestions to stimulate interest in pharmacy publications" was (3.40). The highest score was obtained for the element "the pharmacist believes that teaching undergraduate students about pharmacy publications should be an integral part of the practice" was (3.68). The score for "creating awareness about pharmacy practice-based pharmacy publications and benefits to practice" was (3.58). The score for the single-test reliability analysis of McDonald's  $\omega$  was (0.905), Cronbach's  $\alpha$  was (0.908), Gutmann's  $\lambda_2$  was (0.923), Gutmann's  $\lambda_6$  was (0.981), and greater lower bound was (0.993). **Conclusion:** The perception of pharmacists about scientific publication was found to be inadequate to fair. Therefore, removing the obstacles such as high workload and encouraging pharmacy staff to publish should improve the perception of performance publications in Saudi Arabia.

**Key words:** Perception, Pharmacists, Scientific, Publications Saudi Arabia.

## INTRODUCTION

After graduation, pharmacists, in general, will practice in either healthcare organizations or academia, community pharmacy, or the pharmaceutical industry. Each of these practice areas demands a certain level of research by the department of research and development (R&D). Thus, the hospital pharmacist can specialize in various styles. There are several types of specialties in pharmacy practice, including cardiology, critical care, drug information, nutrition support, infectious diseases, and pharmacy research specialties.<sup>1,2</sup> Usually, the pharmacist can choose from these aforementioned fields based on their interest and perception. The hospital or community pharmacist provides pharmaceutical care to the patients daily.<sup>3</sup> Each morning, the pharmacist receives the prescriptions and prepares them for delivery to the patients. The preparation might be done at an ambulatory care pharmacy with a ready package, by cart filling for the unit dose distribution system, or parenteral preparation under a sterile area.<sup>4</sup>

After completing the preparation, the pharmacist dispenses the medications to ambulatory care or community patients with proper counseling. The unit dose delivery distributes the medicines if the drug is at an inpatient pharmacy.<sup>4</sup> The parenteral medication preparation requires preparation skills emphasizing infection control procedures and follow-up of the medication procurement. The aforementioned duties happen daily without rest until the end of the day. Sometimes, the hospital or the pharmacy provides educational lectures. The pharmacist might have had a high workload to make something new, such as research or scientific publications. Lack of time and support by the pharmacy administration will prevent them from scientific publications.<sup>5</sup> Moreover, disengagement from research and publication can develop a wrong perception about publications among pharmacists. The pharmacist needs to be encouraged for publication. Therefore, it was highly essential to explore the perception of pharmacists

about scientific publications in order to know the actual perception of pharmacists of scientific publications. They dedicated the reasons for perception and elements of stimulation. It is essential to have a positive perception of research publications in pharmacy practice. For example, if the pharmacist has a positive perception of research publications, then he/she will specialize in it and provide various outcomes.

On the contrary, if the pharmacist has a negative perception, then he/she will encounter multiple barriers that prevent them from publishing their work.<sup>5,6</sup> Therefore, it is of utmost importance that we improve the perception of pharmacists about scientific publications so that they attempt to publish their work. So far, there are only a few studies that have discussed the perception of pharmacists about scientific publications.<sup>5-7</sup> Most of the previous studies have focused on pharmacist perception about research.<sup>8-12</sup> However, to the best of our knowledge, there are no studies have been conducted locally or in the Middle Eastern countries about the perception of pharmacists about scientific publications. Therefore, in this study, we aimed to assess the perception of pharmacists concerning research and publication in the Kingdom of Saudi Arabia.

## METHODS

This is a six-month cross-sectional study conducted to assess the perception of pharmacists about scientific publications in Saudi Arabia. We used a self-reported electronic survey questionnaire to obtain responses and distributed it to pharmacists, including interns to consultants and specialists in Saudi Arabia. All non-pharmacists, students, and incomplete surveys were excluded from the study. The survey collected demographic information of the responding pharmacists, their perception of scientific publications, and barriers that prevent them from participating in pharmacy scientific publications. We also collected their suggestions for stimulating their interest in publishing their work. We used a 5-point Likert response scale system with close-ended questions to obtain responses. According to the previous literature with unlimited population size, the sample was calculated for this cross-sectional study with the following parameters: the confidence level of 95%, a *z* score of 1.96, the margin of error of 5%, the population percentage of 50%, and drop-out rate of 10%.

Consequently, the sample size was calculated as 418 with a power of study of 80%.<sup>13-15</sup> The response rate required for this sample size was at least 60–70%.<sup>15,16</sup> The survey was distributed through social media such as Telegram, WhatsApp, and via face-to-face contact. In addition, a reminder message was sent once every 1-2 weeks. Expert reviewers and pilot testing validated the survey. The reliability tests such as McDonald's  $\omega$ , Cronbach's  $\alpha$ s, Gutmann's  $\lambda$ 2, and Gutmann's  $\lambda$ 6 were conducted. The data were collected through the Survey Monkey system and analyzed with Microsoft Excel (version 16), Statistical Package of Social Sciences (SPSS), and Jeffery's Amazing Statistics Program (JASP) software. We performed descriptive and frequency analysis, the goodness of fit analysis, correlation analysis, and inferential analysis on the factors that affect the perception of pharmacists about scientific publications. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided fore reporting of this study.<sup>17-19</sup>

## RESULTS

A total number of 543 pharmacists responded to this questionnaire. Of them, more than one-quarter belonged to the central region (155 (28.55%)) and eastern region (133 (24.49%)), with a statistically significant difference between the provinces ( $p=0.000$ ). Most of the responders were from private primary care centers (110 (20.26%)) and Ministry of Health (MOH) hospitals (97 (17.86%)), with statistically significant differences between working sites ( $p=0.000$ ). There were 321 (59.12%) female and

222 (40.88%) male responders. Based on nationality, there were 351 (64.64%) Saudi nationals and 192 (35.36%) non-Saudi nationals, with statistically significant differences between them ( $p=0.000$ ). Most of the responders were in the age group of 30–44 years (209 (38.49%)) and 18–29 years (166 (30.57%)), with statistically significant difference between all age groups ( $p=0.000$ ). Most of the pharmacists were community pharmacists (107 (19.74%)) and pharmacy supervisors (57 (10.52%)), with statistically significant differences between all levels of qualifications ( $p=0.000$ ). Most of the responders held Diploma in Pharmacy (202 (37.20%)), Bachelor in pharmacy (199 (36.65%)), and Master of Science in Clinical Pharmacy degree (140 (25.78%)). Most of the pharmacists had a work experience of 6–10 years (140 (34.15%)) and 3–5 years (124 (30.24%)), with a statistically significant difference between all levels of work experience ( $p=0.000$ ). More than two-thirds of the responders were board-certified pharmaceutical specialists (367 (68.21%)). Most of them were Board Certified Critical Care (220 (40.89%)) and Board-Certified Nuclear Pharmacist (218 (40.52%)), followed by Board Certified Ambulatory Care (192 (35.69%)) and Board-Certified Nutrition Support 187 (34.76%) pharmacists. Most of the practice areas were in the department of narcotics (61 (11.25%)), clinical pharmacy (59 (10.89%)), and repacking (57 (10.52%)), with statistically significant difference between all sites ( $p=0.000$ ). There was a medium positive correlation between age (years) and years of experience in pharmacy career based on Kendall's tau\_b (0.414) and Spearman's rho (0.485) correlation coefficients, with a statistically significant difference between them ( $p<0.001$ ). There was a medium positive correlation between the worksite and current position based on Kendall's tau\_b (0.457) and Spearman's rho (0.610) correlation coefficients, with a statistically significant difference between them ( $p<0.001$ ) (Tables 1 and 2). The average score of perception of pharmacists about scientific publications was (3.74). The element "the pharmacist understands the pharmacy publication and pharmacy publications terminology" obtained a score of 3.33. The pharmacists believe that pharmacy publications are essential for the pharmacist (3.97). They are interested in working on a pharmacy publications project. In contrast, the lowest score was obtained for the element "the pharmacy publications vital for my recognition and self-satisfaction" (3.40). The score for the element "the pharmacist can evaluate the pharmacy publications findings regarding their application to pharmacy practice" was 3.58, and for the element "pharmacists believe that the pharmacy publications enhance the quality of patient care" was 3.59, with a statistically significant difference between the responses ( $p<0.05$ ). All aspects of perception of pharmacists about scientific publications were statistically significant between responses ( $p<0.05$ ) (Table 3). The average score for the element "barriers that prevent pharmacists from participating in pharmacy scientific publication" was 3.76. The score for the element "the pharmacist believes the daily activities prevent me from doing pharmacy publication Lack of interest and motivation" was (3.88). The score for the element "pharmacist considers those pharmacy publications essential for the pharmacist" was 3.85. In contrast, low scores were obtained for the elements "difficulty in obtaining ethical approval" (3.64) and "lack of supervision/mentorship" (3.68), with statistically significant difference between the responses ( $p<0.05$ ). All responses about aspects of perception of pharmacists about scientific publications were statistically significant ( $p<0.05$ ) (Table 4). The average score for the element "suggestions to stimulate interest in pharmacy publications" was (3.40). The highest score (3.68) was obtained for the element "the pharmacist believes that teaching undergraduate about pharmacy publication to students should be an integral part of the practice. The score for the element "creating awareness about practice-based pharmacy publications and benefits to practice" was (3.58). In contrast, the score for the element "have pharmacy publications-experienced pharmacist's mentor" was

Locations	Response Count	Response Percent	p-value (X2)
Central area	155	28.55%	0.000
North area	115	21.18%	
South area	52	9.58%	
East area	133	24.49%	
West area	88	16.21%	
Answered question	543		
Skipped question	0		
Site of work	Response Count	Response Percent	p-value (X2)
Ministry of Health	85	15.65%	0.000
General Medical Directorate in Region	68	12.52%	
MOH government Hospital	97	17.86%	
Non- MOH government Hospital	48	8.84%	
MOH-Primary Care Center	31	5.71%	
Private Hospital	16	2.95%	
Private Primary Care Center	110	20.26%	
Community pharmacy	48	8.84%	
University	27	4.97%	
Pharmaceutical company	8	1.47%	
Non employment	5	0.92%	
Answered question	543		
Skipped question	0		
Gender	Response Count	Response Percent	
Male	222	40.88%	0.000
Female	321	59.12%	
Answered question	543		
Skipped question	0		
Nationality	Response Count	Response Percent	
Saudi	351	64.64%	0.000
Non-Saudi	192	35.36%	
Answered question	543		
Skipped question	0		
Age	Response Count	Response Percent	
18-29	166	30.57%	0.000
30-44	209	38.49%	
45-60	137	25.23%	
> 60	31	5.71%	
Answered question	543		
Skipped question	0		

Pharmacist's Qualifications	Response Count	Response Percent	p-value (X2)
Diploma pharmacy	46	8.47%	0.000
BSc. Pharm	199	36.65%	
M.S	91	16.76%	
MSc. Clinical Pharmacy	140	25.78%	
Pharm.D	202	37.20%	
Ph.D	98	18.05%	
MBA	83	15.29%	
Pharmacy Residency Two years (R1)	90	16.57%	
Pharmacy Residency one year (R2)	93	17.13%	
Fellowship	127	23.39%	
Student pharmacist	69	12.71%	
Intern pharmacist	23	4.24%	
Answered question	543		
Skipped question	0		
Board of Pharmacy Specialties certificate	Response Count	Response Percent	
Board Certified Ambulatory Care Pharmacist (BCACP)	192	35.69%	
Board Certified Critical Care Pharmacist (BCCCP)	220	40.89%	
Board Certified Nuclear Pharmacist (BCNP)	218	40.52%	
Board Certified Nutrition Support Pharmacist (BCNSP)	187	34.76%	
Board-certified Oncology Pharmacist (BCOP)	39	7.25%	
Board Certified Pediatric Pharmacy Specialist (BCPPS)	58	10.78%	
Board Certified Pharmacotherapy Specialists (BCPS)	71	13.20%	
Board-certified Psychiatric Pharmacist (BCPP)	64	11.90%	
Non	171	31.78%	
Answered question	538		
Skipped question	5		
Position Held	Response Count	Response Percent	
General Manager of Pharmaceutical care	13	2.40%	0.000
Manager of Pharmaceutical care at the region	49	9.04%	
Director of Hospital pharmacy	42	7.75%	
Supervisor of pharmacy units	57	10.52%	
Director of Primary care center pharmacy	38	7.01%	

Continued...

<b>Table 2: Cont'd</b>				
Pharmacy Technicians	51	9.41%		
Lecturer	24	4.43%		
Staff Pharmacist	49	9.04%		
Community Pharmacist	107	19.74%		
Clinical Pharmacist	27	4.98%		
Deputy Director of Pharmacy	49	9.04%		
Manager	26	4.80%		
Pharmaceutical company representative	4	0.74%		
Pharmaceutical company supervisor	1	0.18%		
Non employment	5	0.92%		
Answered question	<b>542</b>			
Skipped question	<b>1</b>			
<b>Years of experience at Dentists career</b>	<b>Response Count</b>	<b>Response Percent</b>		
<3	64	15.61%	0.000	
3-5	124	30.24%		
6-10	140	34.15%		
11-15	65	15.85%		
> 15	17	4.15%		
Answered question	<b>410</b>			
Skipped question	<b>133</b>			
<b>Pharmacy practice area</b>	<b>Response Count</b>	<b>Response Percent</b>		
Inpatient Pharmacy	51	9.41%	0.000	
Outpatient Pharmacy	38	7.01%		
Satellite Pharmacy	45	8.30%		
Narcotics	61	11.25%		
Extemporaneous Preparation	28	5.17%		
Clinical Pharmacy	59	10.89%		
Inventory Control	34	6.27%		
Drug Information	4	0.74%		
Emergency pharmacy	39	7.20%		
Medication safety	39	7.20%		
Repacking	57	10.52%		
Pharmacy Education and Training	24	4.43%		
Pharmacy Research	15	2.77%		
Primary care pharmacy	28	5.17%		
Community pharmacy	9	1.66%		
Pharmaceutical company	6	1.11%		
Regulation/Administration	1	0.18%		
Non employment	4	0.74%		
Answered question	<b>543</b>			
Skipped question	<b>0</b>			

(3.15) and for “provide administrative/organizational support and lead the project” was (3.23), with statistically significant difference between responses ( $p < 0.05$ ). All aspects of pharmacist perceptions of scientific publications were statistically significant ( $p < 0.05$ ) (Table 5). The score for single-test reliability analysis of McDonald's  $\omega$  was 0.905, Cronbach's  $\alpha$  was 0.908, Gutmann's  $\lambda_2$ , 0.923, Gutmann's  $\lambda_6$  was 0.981, and Greater Lower Bound was 0.993.

### Factors affecting the perception of pharmacists about a scientific article

Factors affecting the knowledge of writing a research paper were analyzed. Using the independent samples Kruskal–Wallis test and the Bonferroni correction for multiple tests, we adjusted the significant values. The factors that might affect pharmacists' perception about writing a research paper include location, worksite, gender, age, practice area, current position held, and years of experience. Five locations affected the perception of pharmacists about scientific publications. The central region showed the highest scores (2.6147) with statistically significant differences between regions ( $p = 0.000$ ). Non-Saudi pharmacists showed the lowest score (1.9896), with a statistically significant difference between nationality ( $p = 0.000$ ). Based on gender, female responders showed low score (2.2164) than that of males (2.4802), with a statistically significant difference between them ( $p = 0.000$ ). The age of the responders affected the perception of scientific publications. Pharmacists aged 55-64 years showed the lowest score (1.2045), with a statistically significant difference between all age groups ( $p = 0.000$ ). Fourteen worksites affected the use of a type of scientific publications, with the lowest score being at MOH (1.8953) and MOH hospital (1.9245) with a statistically significant difference ( $p = 0.000$ ). Twelve practice areas affect the perception of pharmacists about scientific publications. The lowest score (1.4860) was obtained for the medications safety and narcotic section (1.4705), with a statistically significant difference between various sections ( $p = 0.000$ ). Five levels of work experience affected the perception of publication. The lowest score (1.7708) was obtained for those with work experience of 6–10 years, with a statistically significant difference between all levels ( $p = 0.000$ ). Fifteen levels of the position held affected the perception of pharmacists, with the lowest score (1.1775) obtained for the position of pharmacy technician and director of primary care center (1.2368), with a statistically significant difference between all levels ( $p = 0.000$ ). The relationship between the perception of scientific publications and factors affecting it such as location, worksite, age (years), gender, nationality, practice area, position held, and years of experience in a pharmacy career. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an expletory variable. There was a medium relationship ( $R = 0.483$  with  $p = 0.000$ ) between the perception of scientific publications and factors involving it. Six out of eight were non-significant differences ( $p > 0.05$ ). However, multiple regression analysis confirmed that two factors (i.e., nationality and gender) explained 36.3% and 16.7% respectively of the negative relationship to the variation in perception, with a statistically significant difference ( $p = 0.000$  and  $0.001$ , respectively) Bootstrap model also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with the current position factor with variance inflation factor (VIF) of 1.536 and 1.222, respectively less than three or five as an acceptable number of VIF.<sup>[20-22]</sup> (Table 6).

A single factor (gender) did not affect the pharmacist's perception of barriers preventing scientific publications with a non-statistically significant difference ( $p > 0.05$ ). Five locations affected the perception of obstacles preventing scientific publications from the practice. The Eastern region showed the lowest scores (2.1638) with a statistically significant difference ( $p = 0.007$ ). Nationality also affected the scores. Non-Saudi pharmacists showed the lowest score (2.0820), with a

**Table 3: The Pharmacist's Perception of Scientific Publications.**

	Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Total	Weighted Average	p-value
The pharmacy publications essential for the pharmacist?	296	54.51%	119	21.92%	34	6.26%	1	0.18%	93	17.13%	543	3.97	0.000
My daily practice is influenced by evidence-based practice publications?	228	41.99%	188	34.62%	29	5.34%	16	2.95%	82	15.10%	543	3.85	0.000
The publications finding are usually relevant to me as practicing pharmacist?	148	27.31%	244	45.02%	60	11.07%	9	1.66%	81	14.94%	542	3.68	0.000
The pharmacy publications enhance the quality of patient care?	163	30.02%	170	31.31%	112	20.63%	19	3.50%	79	14.55%	543	3.59	0.000
The pharmacy publications is essential to increase my knowledge and improve my skills?	163	30.02%	132	24.31%	129	23.76%	118	21.73%	1	0.18%	543	3.62	0.000
The pharmacy publications is vital for my recognition and self-satisfaction?	149	27.44%	100	18.42%	124	22.84%	157	28.91%	13	2.39%	543	3.40	0.000
Teaching pharmacy publications should be a part of the training program/pharmacy college curriculum?	148	27.66%	135	25.23%	186	34.77%	46	8.60%	20	3.74%	535	3.64	0.000
Performing pharmacy publications is a complicated subject?	154	28.36%	119	21.92%	187	34.44%	70	12.89%	13	2.39%	543	3.61	0.000
Reading pharmacy publications studies in the literature is enjoyable?	168	31.00%	205	37.82%	120	22.14%	36	6.64%	13	2.40%	542	3.88	0.000
I am interested in working on a pharmacy publications project?	171	31.49%	223	41.07%	114	20.99%	23	4.24%	12	2.21%	543	3.95	0.000
I can understand the pharmacy publication and pharmacy publications terminology?	185	34.13%	227	41.88%	113	20.85%	17	3.14%	0	0.00%	542	4.07	0.000
I can and conducted pharmacy publications project without supervision?	166	30.63%	159	29.34%	126	23.25%	59	10.89%	32	5.90%	542	3.68	0.000
I can evaluate the pharmacy publications findings regarding their application to pharmacy practice?	131	24.13%	188	34.62%	116	21.36%	79	14.55%	29	5.34%	543	3.58	0.000
I can perform a pharmacy publications project?	137	25.70%	204	38.27%	106	19.89%	77	14.45%	9	1.69%	533	3.72	0.000
I am waiting to perform pharmacy publications if given research time during my training/ teaching/ working hours?	164	30.20%	216	39.78%	91	16.76%	46	8.47%	26	4.79%	543	3.82	0.000
I am willing and capable of involvement in pharmacy publications as a principal investigator or co-investigator	173	31.86%	191	35.17%	85	15.65%	47	8.66%	47	8.66%	543	3.73	0.000
I am willing and capable of presenting my research as the poster or oral presentation at any scientific conference?	180	33.15%	173	31.86%	109	20.07%	37	6.81%	44	8.10%	543	3.75	0.000
I am interested in publishing my research in the scientific medical journal?	167	30.76%	188	34.62%	121	22.28%	34	6.26%	33	6.08%	543	3.78	0.000
Pharmacy publications should NOT be left to full-time pharmacist	135	24.86%	235	43.28%	115	21.18%	29	5.34%	29	5.34%	543	3.77	0.000
I plan to participate in pharmacy publications in the future.	176	32.41%	205	37.75%	87	16.02%	56	10.31%	19	3.50%	543	3.85	0.000
Answered											543		
Skipped											0		

**Table 4: The barriers that prevent Pharmacists from participating in pharmacy scientific publication.**

	Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Total	Weighted Average	p-value
Lack of interest and motivation?	171	31.49%	202	37.20%	120	22.10%	16	2.95%	34	6.26%	543	3.85	0.000
Lack of research training?	94	17.67%	305	57.33%	93	17.48%	24	4.51%	16	3.01%	532	3.82	0.000
The daily activities prevent me from doing pharmacy publication?	61	11.42%	373	69.85%	77	14.42%	21	3.93%	2	0.37%	534	3.88	0.000
Difficulties in finding the proper idea for the pharmacy publication?	91	16.76%	302	55.62%	114	20.99%	33	6.08%	3	0.55%	543	3.82	0.000
Difficulties in defining target journal, and eligibility criteria?	81	14.92%	282	51.93%	129	23.76%	45	8.29%	6	1.10%	543	3.71	0.000
Difficulties in obtaining ethical approval?	127	23.39%	189	34.81%	141	25.97%	78	14.36%	8	1.47%	543	3.64	0.000
Difficulties in writing interpreting the results?	124	22.84%	204	37.57%	147	27.07%	67	12.34%	1	0.18%	543	3.71	0.000
Lack of supervision/mentorship?	127	23.83%	197	36.96%	137	25.70%	54	10.13%	18	3.38%	533	3.68	0.000
Difficulties Writing a manuscript for publication in a scientific journal	163	30.07%	198	36.53%	67	12.36%	95	17.53%	19	3.51%	542	3.72	0.000
Answered											543		
Skipped											0		

**Table 5: The barriers the suggestions to stimulate interest in pharmacy publications.**

	Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Total	Weighted Average	p-value
Assurance that pharmacy publications results will be implemented in practice	22.51%	122	21.59%	117	27.86%	151	20.85%	113	7.20%	39	542	3.31	0.000
Reimbursement for conducting pharmacy publications in pharmacy practice	9.78%	53	32.47%	176	35.79%	194	19.00%	103	2.95%	16	542	3.27	0.000
Improved/integrated interaction between pharmacist and other healthcare teams	13.10%	71	34.69%	188	38.75%	210	11.99%	65	1.48%	8	542	3.46	0.000
Creating awareness about pharmacy practice-based pharmacy publications and benefit to practice	18.27%	99	34.13%	185	34.87%	189	12.36%	67	0.37%	2	542	3.58	0.000
Recognition by other members of healthcare team	16.97%	92	22.69%	123	52.03%	282	8.12%	44	0.18%	1	542	3.48	0.000
Teach undergraduates that pharmacy publications are an integral part of the practice.	27.09%	146	25.23%	136	39.89%	215	4.27%	23	3.53%	19	539	3.68	0.000
Provide continuing education points for pharmacy publications participation	19.74%	107	29.34%	159	33.76%	183	12.18%	66	4.98%	27	542	3.47	0.000
Provide administrative/organizational support and lead the project	16.39%	89	18.78%	102	40.52%	220	19.89%	108	4.42%	24	543	3.23	0.000
Have pharmacy publications-experienced pharmacists mentor	9.59%	52	25.46%	138	39.67%	215	21.03%	114	4.24%	23	542	3.15	0.000
Provide training specific to the pharmacy publications	22.28%	121	18.60%	101	32.60%	177	20.44%	111	6.08%	33	543		0.000
Answered											543		
Skipped											0		

**Table 6: Multiple regression of Factors with the Pharmacist's Perception of Scientific Publications.**

Model	R	R Square	F	Sig.	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
					B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.483 <sup>b</sup>	.233	15.221	.000 <sup>b</sup>	3.716	0.199		18.628	0.000	3.324	4.108		
Locations					-0.020	0.026	-0.037	-0.785	0.433	-0.071	0.030	0.882	1.134
Sector of work					-0.003	0.018	-0.010	-0.161	0.872	-0.039	0.033	0.489	2.043
Age (years)					0.020	0.017	0.056	1.174	0.241	-0.014	0.054	0.844	1.186
Nationality					-0.611	0.091	-0.363	-6.692	0.000	-0.790	-0.431	0.651	1.536
Sex					-0.281	0.082	-0.167	-3.442	0.001	-0.441	-0.120	0.818	1.222
Practice area					-0.011	0.009	-0.059	-1.145	0.253	-0.029	0.008	0.724	1.381
Current Position					0.014	0.013	0.063	1.110	0.268	-0.011	0.040	0.595	1.681
Experiences					-0.076	0.040	-0.099	-1.921	0.055	-0.154	0.002	0.716	1.397

a. Dependent Variable: Pharmacist's Perception of Scientific Publications<sup>a</sup>, Predictors<sup>b</sup>: (Constant), Location, Site of work, Age (years), Nationality, Pharmacist gender, Practice area, Current Position, and pharmacist experiences

#### Bootstrap for Coefficients

Model	B	Bootstrap <sup>a</sup>				
		Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
1 (Constant)	3.716	-0.009	0.182	0.001	3.360	4.090
Locations	-0.020	0.001	0.027	0.482	-0.073	0.031
Sector of work	-0.003	0.000	0.020	0.890	-0.043	0.038
Age (years)	0.020	0.001	0.019	0.286	-0.015	0.058
Nationality	-0.611	-0.004	0.095	0.001	-0.801	-0.421
Sex	-0.281	0.006	0.081	0.001	-0.434	-0.113
Practice area	-0.011	0.000	0.011	0.308	-0.032	0.010
Current Position	0.014	-0.001	0.012	0.246	-0.012	0.038
Experiences	-0.076	0.001	0.048	0.119	-0.173	0.018

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

statistically significant difference between the various nationals ( $p=0.000$ ). Six different age groups affected the perception of barriers preventing publication practice, with the lowest score (1.444) obtained for the age group of 75 and above, with statistically significant differences ( $p=0.000$ ). Fourteen working sites affected the knowledge of types of scientific publications, with the lowest score (1.6902) obtained for the private primary care centers, with a statistically significant difference ( $p=0.000$ ). Twelve practice areas affected the knowledge of types of scientific publications, with the lowest score (1.8205) obtained for the emergency pharmacy with a statistically significant difference ( $p=0.000$ ). Five levels of years of experience affected the knowledge of types of scientific publications, with the lowest score (2.1767) obtained for 6–10 years of work experience, with statistically significant difference between them ( $p=0.000$ ). Fifteen levels of the position held affected the knowledge of types of scientific publications, with the lowest score (1.7113) obtained for the community pharmacy with statistically significant difference ( $p=0.000$ ). The relationship between the perception of pharmacists about barriers preventing pharmacists from participating in scientific publications and factors affecting it were analyzed. The multiple regression analysis was performed by considering the perception of obstacles that prevent pharmacists from participating in scientific publications as the dependent variable and factors affecting it as

the explanatory variable. There was a medium relationship ( $R=0.420$  with  $p=0.000$ ) between the dependent and the explanatory variables. Four out of eight factors showed non-significant differences ( $p>0.05$ ). However, three factors such as location, nationality, and practice area explained 11.8%, 29.1%, and 2.1% negative relationship. In contrast, the factor's current position explained 16.4% of the positive relationship to the variation in pharmacist perception of barriers. There was a statistically significant difference between the four variables ( $p=0.015$ , 0.000, 0.000, and 0.015, respectively). The non-existence of multicollinearity verified the relationship with the current position factor with variance inflation factor (VIF) of 1.134, 1.536, 1.381, and 1.681, respectively, which was less than three or five as an acceptable number of VIF<sup>20-22</sup> (Table 7).

Five locations affected the perception of pharmacists about stimulating interest in scientific publications. The western region showed the lowest scores (2.2970) with a statistically significant difference ( $p=0.000$ ). Nationality also affected the scores, with non-Saudi having the highest score (2.8464), with a statistically significant difference ( $p=0.000$ ). Gender affected the perception of pharmacists about stimulating interest in scientific publications, with the highest score obtained for females (2.6822) followed by males (2.4949), with a statistically significant difference between gender ( $p=0.000$ ). Six different age groups affected the perception of stimulation of scientific publications.

**Table 7: Multiple regression of Factors with the barriers prevent Pharmacists participating in scientific Publications<sup>a</sup>.**

Model	R	R Square	F	Sig.	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
					B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.420 <sup>b</sup>	.176	10.680	.000 <sup>b</sup>	3.140	0.163		19.293	0.000	2.820	3.459		
Locations					-0.051	0.021	-0.118	-2.435	0.015	-0.092	-0.010	0.882	1.134
Sector of work					-0.018	0.015	-0.080	-1.230	0.219	-0.048	0.011	0.489	2.043
Age (years)					0.000	0.014	-0.002	-0.034	0.973	-0.028	0.027	0.844	1.186
Nationality					-0.385	0.074	-0.291	-5.176	0.000	-0.532	-0.239	0.651	1.536
Sex					0.036	0.067	0.027	0.545	0.586	-0.095	0.167	0.818	1.222
Practice area					-0.031	0.008	-0.221	-4.144	0.000	-0.046	-0.016	0.724	1.381
Current Position					0.029	0.010	0.164	2.792	0.005	0.009	0.050	0.595	1.681
Experiences					0.009	0.032	0.015	0.279	0.780	-0.054	0.072	0.716	1.397

a. Dependent Variable: Pharmacist's Perception barriers prevent participating in scientific Publications, Predictors<sup>b</sup>: (Constant), Location, Site of work, Age (years), Nationality, Pharmacist gender, Practice area, Current Position, and pharmacist experiences

#### Bootstrap for Coefficients

Model	B	Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
					Bootstrap <sup>a</sup>	
1 (Constant)	3.140	9.790E-06	0.160	0.001	2.838	3.457
Locations	-0.051	0.001	0.024	0.027	-0.096	-0.002
Sector of work	-0.018	0.000	0.018	0.316	-0.053	0.017
Age (years)	0.000	0.001	0.012	0.961	-0.023	0.024
Nationality	-0.385	-0.002	0.079	0.001	-0.537	-0.228
Sex	0.036	0.003	0.077	0.640	-0.123	0.190
Practice area	-0.031	0.000	0.009	0.001	-0.050	-0.014
Current Position	0.029	-8.201E-05	0.011	0.009	0.008	0.050
Experiences	0.009	-0.002	0.041	0.849	-0.073	0.087

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The lowest score (1.2500) was obtained for those in the age group of 65–74 years, with a statistically significant difference between all age groups ( $p=0.000$ ). Fourteen worksites affected the perception of stimulation of scientific publications, with the lowest score (2.0741) obtained for the university, with a statistically significant difference between all worksites ( $p=0.000$ ). Twelve practice areas affected the perception of stimulation of scientific publications, with the lowest score (1.7537) obtained for the pharmaceutical companies and pharmacy research practice areas (2.1800), with statistically significant differences between all practice areas ( $p=0.000$ ). Five levels of years of experience affected the perception of stimulation of scientific publications, with the lowest score (2.0800) obtained for those who had less than three years of experience, with a statistically significant difference for all levels of expertise ( $p=0.000$ ). Fifteen levels of positions held affected the perception of stimulation of scientific publications, with the lowest score obtained for the position of representative of pharmaceutical companies (1.9056) and staff pharmacist (2.0615), with a statistically significant difference between all positions ( $p=0.000$ ). Next, we analyzed the relationship between the perception of suggestions about stimulating interest in scientific publications and factors affecting it. Multiple regression analysis was performed to investigate the relationship between the dependent variable and factors affecting it. The study revealed a medium

relationship ( $R=0.420$  with  $p=0.000$ ) between the perception of scientific publications and factors. Six out of eight factors were found to be non-significant ( $p>0.05$ ). However, multiple regression analysis confirmed that one factor (location) explained a 15.3% negative relationship. Besides, two factors (nationality and years of experience) explained 33.6% and 16.9% positive relationship to the variation, with a statistically significant difference ( $p=0.001$ , 0.000, and 0.001) respectively, which the Bootstrap model confirmed. In addition, the relationship was verified by the non-existence of multicollinearity with the current position held with  $VIF=1.134$ , 1.536, and 1.397, respectively, less than three or five<sup>20-22</sup> (Table 8).

## DISCUSSION

The perception and attitude of pharmacists reflected their participation in the research and publication process.<sup>23,24</sup> Knowledge is the background of perception;<sup>25</sup> therefore, exploring the perception of pharmacists is critical to setting up a plan for improving and changing attitudes and perceptions of scientific publications. The survey questionnaire was validated based on a high-reliability test and a convenient sample. The majority of the responders were from the local region and had different ages, gender, nationality, occupational status, and membership of healthcare boards. The average score of perception of pharmacists



**Table 8: Multiple regression of Factors with the suggestions to stimulate interest in scientific Publications<sup>a</sup>.**

Model	R	R Square	F	Sig.	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
					B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.486 <sup>b</sup>	.236	15.452	.000 <sup>b</sup>	1.677	0.155		10.818	0.000	1.372	1.981		
Locations					-0.066	0.020	-0.153	-3.296	0.001	-0.105	-0.026	0.882	1.134
Sector of work					0.004	0.014	0.020	0.314	0.754	-0.023	0.032	0.489	2.043
Age (years)					0.014	0.013	0.049	1.025	0.306	-0.013	0.040	0.844	1.186
Nationality					0.440	0.071	0.336	6.207	0.000	0.301	0.580	0.651	1.536
Sex					0.110	0.063	0.084	1.730	0.084	-0.015	0.234	0.818	1.222
Practice area					-0.012	0.007	-0.085	-1.649	0.100	-0.026	0.002	0.724	1.381
Current Position					0.009	0.010	0.053	0.936	0.350	-0.010	0.029	0.595	1.681
Experiences					0.100	0.031	0.169	3.266	0.001	0.040	0.161	0.716	1.397

a. Dependent Variable: Pharmacist's Perception suggestions to stimulate interest in scientific Publications<sup>a</sup>, Predictors <sup>b</sup>: (Constant), Location, Site of work, Age (years), Nationality, Pharmacist gender, Practice area, Current Position, and pharmacist experiences

#### Bootstrap for Coefficients

Model	B	Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
1 (Constant)	1.677	0.003	0.179	0.001	1.308	2.022
Locations	-0.066	-0.001	0.021	0.004	-0.111	-0.025
Sector of work	0.004	0.001	0.014	0.730	-0.021	0.034
Age (years)	0.014	0.000	0.013	0.293	-0.013	0.038
Nationality	0.440	0.000	0.066	0.001	0.317	0.570
Sex	0.110	-0.002	0.063	0.091	-0.018	0.231
Practice area	-0.012	0.000	0.008	0.121	-0.026	0.003
Current Position	0.009	0.000	0.009	0.308	-0.008	0.027
Experiences	0.100	0.000	0.039	0.009	0.022	0.178

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

about scientific publications was found to be satisfactory. This result emphasizes the fact there is a positive attitude among pharmacists about understanding the basic terminology of publications. They also believe that pharmacy publications are essential for them, which is similar to the results of a previous study.<sup>25</sup>

However, some aspects of perceptions did not reach an optimal level. For instance, pharmacists believe that pharmacy publications should not necessarily be done for the sake of self-recognition or satisfaction. Participation in scientific publications is a factor or tool for promotions in the pharmacy practice. It is challenging to consider the employment proportion by a long and complicated procedure of scientific publication. Moreover, a pharmacist is not fully skilled in evaluating publication-related activities. Furthermore, the pharmacist did not fully agree that publications improved patient's quality of life. That has explored insufficient experiences in research practice, particularly the pharmacist did not participate in any clinical trials at their healthcare organizations. The findings of this study showed that the average perception of barriers that prevent the implementation of scientific publication was satisfactory. The pharmacists believe that the most significant barriers were busy schedules and lack of interest and motivation, similar to a previous study<sup>5</sup> and differed from another.<sup>6</sup> If the pharmacy department does not have a research and development section, then the institution's basic

policies and procedures of research publications should be changed, which agrees with a previous study.<sup>26</sup> In that case, the pharmacist might be depressed to do the scientific research and publications. Therefore, pharmacists believe that research publications are not necessarily there for career improvement and promotion. The pharmacists are not considered some barriers like ethical approval or lack of support of a mentor. However, the ethical committee can facilitate the acceptance of research, and educators or mentors can supervise the research and support the pharmacists willing to publish. They provide full cooperation for publication. The average scores of stimulation elements were fair, emphasizing the undergraduate and postgraduate education and training of scientific publications.

#### Factors affecting the perception of pharmacists about scientific publications

Various factors might affect the perception of scientific publications. Based on the geographic location of the pharmacist, the central region showed a high perception of scientific publications because it contained several Healthcare institutions and research Center done various scientific publications annually. Moreover, the university published multiple articles in various scientific journals. Saudi pharmacists had a higher perception than non-Saudi pharmacists because they

have appropriate education and training, which might help promote pharmacy careers. Male responders had more perceptions of scientific publications than female responders because they were more interested in research and publications. Older pharmacists with less experience had a low perception of scientific publication, which is related to reducing the perception by the time with getting old, with continues busy workload. Besides, the pharmacist publication was not recognized by the pharmacy administration or the absence of support from the healthcare administration. The Ministry of Health (MOH) hospital showed an inadequate perception of scientific publications related to the lack of financial or administrative support and weak research and development activities. The pharmacy practice area or higher position held negatively affected the perception of scientific publications, which maybe because of the busy schedule of administration activities.

Various factors might affect the perception of barriers preventing scientific publications. For instance, based on the pharmacists' geographic location, the eastern region showed the lowest perception because most of the obstacles did not exist or were removed. Non-Saudi pharmacists had a low perception of barriers than that of Saudi pharmacists. They participated in the publication related activities without barriers or were not interested in the scientific publications. Old pharmacists with high experience and higher jobs affected the perception of scientific publications, which is related to a busy schedule or not being interested in doing research and publication. The practice area affected the perception development of non-interested pharmacists because they were busy and did not find support from higher administration. Various factors affected the perception of the stimulation elements for scientific publications. For instance, based on the geographic location, western region showed the lowest perception, which is related to the well-developed system of scientific publications and the pharmacist had appropriate participation. Non-Saudi professionals had a higher perception because of the administration and financial support from the healthcare organizations. Old pharmacists with more experience had the lowest perception of inadequate interest in scientific publications and busy life. Females needed more support and stimulation than that of males because there were many problems in the scientific publications. The worksite is another factor that affected the stimulation of scientific publication, as universities have everything related to the publications and provide adequate support for publications. The pharmaceutical companies and community pharmacies had the lowest score of stimulation elements, which might be because of the busy schedule and less interest in scientific publication. The pharmacist might get depressed from current situation because unavailable system or policy and procedures of research and scientific publications.

### Limitation

This study had an acceptable sample size with good validation and a high-reliability survey. However, the study showed various drawbacks, such as multiple demographic data including location, worksite, nationality, gender, years of experience, and current position. Therefore, additional study is suggested in the future to overcome the limitation.

### CONCLUSION

The perception of pharmacists about scientific publications was positive. However, the perception of barriers preventing scientific publications stimulation elements of scientific publications was fair. In addition, various factors affected the perception of scientific publications, such as higher age, more experience, and higher positions, which negatively affected the results. However, other factors such as location, gender, and nationality varied. Therefore, clinical and administrative support for scientific publications and implementation programs will improve pharmacy scientific publications' perception in Saudi Arabia.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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None

### Consent for Publications

Informed consent was obtained from all the participants

### Ethical Approval


This research is exempted from research and ethical committee or an institutional review board (IRB) approval.

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html>

### ABBREVIATIONS

**MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **SPSS:** Statistical package of social sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology.

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### REFERENCES

- Alomi YA, Alghamdi SJ, Alattyh RA. Strategic plan of general administration of pharmaceutical care at Ministry of Health in Saudi Arabia 2012-2022. *J Pharm Pharm Sci.* 2015;1(13):1-8.
- Alomi YA, Alghamdi SJ, Alattyh RA, Elshenawy RA. The evaluation of pharmacy strategic plan in past. *Commun Med.* 2013-2016 and Forecasting of New Vision 2030 at Ministry of Health in Saudi Arabia. *J Pharm Pract;*2018(Jun 10);4(2):93-101.
- Buxton JA, Babbitt RM, Clegg CA, Durley SF, Epplen KT, Marsden LM, *et al.* Thompson NS [ASHP guidelines]. ASHP guidelines: Minimum standard for ambulatory care pharmacy practice. *Am J Health Syst Pharm.* 2015 Jul 15;72(14):1221-36. doi: 10.2146/sp150005, PMID 26150573.
- American society of hospital pharmacists. ASHP statement on unit dose drug distribution. *Am J Hosp Pharm.* 1989;46:2346.
- Awaisu A, Alsalmiy N. Pharmacists' involvement in and attitudes toward pharmacy practice research: A systematic review of the literature. *Res Social Adm Pharm.* 2015 Nov;11(6):725-48. doi: 10.1016/j.sapharm.2014.12.008, PMID 25698363.
- Bhagavathula AS, Bandari DK, Jamshed SQ, Chattu VK. Pharmacy students' perception and inclination toward scholarly research publications: A multinational study. *J Educ Health Promot.* 2018;7:131. doi: 10.4103/jehp.jehp\_77\_18, PMID 30505859.
- Shafeeq H, Hammond DA, Swanson JM, Li C, Devlin JW. Critical care PGY-2 graduate perceptions and practices regarding residency project publication. *Am J Pharm Educ.* 2019;83(2):6515. doi: 10.5688/ajpe6515, PMID 30962636.
- Centro de Investigaciones y Publicaciones Farmacéuticas. C, Cátedra Universidad de Granada-Sandoz de Docencia e Investigación en Atención Farmacéutica. M, SPARC (Organization) I, Universidad de Granada. Grupo de Investigación en Atención Farmacéutica. Pharmacists' views on involvement in pharmacy practice research: Strategies for facilitating participation [Internet]. Vol. 5, Pharmacy Practice (Granada). Grupo de Investigación en Atención Farmacéutica, Universidad de Granada, Facultad de Farmacia; 2007 [cited 2017 Jul 26]. 59–66 p. Available from: [http://scielo.isciii.es/scielo.php?pid=S1885-642X2007000200002&script=sci\\_arttext&tlng=en](http://scielo.isciii.es/scielo.php?pid=S1885-642X2007000200002&script=sci_arttext&tlng=en).
- Rosenbloom K, Taylor K, Harding G. Community pharmacists' attitudes towards research. *Int J Pharm Pract.* 2011;8(2):103-10. doi: 10.1111/j.2042-7174.2000.tb00994.x.
- Kritikos VS, Carter S, Moles RJ, Krass I. Undergraduate pharmacy students' perceptions of research in general and attitudes towards pharmacy practice research. *Int J Pharm Pract.* 2013;21(3):192-201. doi: 10.1111/j.2042-7174.2012.00241.x, PMID 23418905.
- Saini B, Brillant M, Filipovska J, Gelgor L, Mitchell B, Rose G, *et al.* Factors influencing Australian community pharmacists' willingness to participate in research projects - an exploratory study. *Int J Pharm Pract.* 2010;14(3):179-88. doi: 10.1211/jpp.14.3.0004.

12. Fakeye TO, Adisa R, Olukotun RT, Morawo PK. Hospital and community pharmacists' perception of the scope, barriers and challenges of pharmacy practice-based research in Nigeria. *Pharm Pract.* 2017;15(1):881-. doi: 10.18549/PharmPract.2017.01.881.
13. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med.* 2013;35(2):121-6. doi: 10.4103/0253-7176.116232, PMID 24049221.
14. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. *Gastroenterol Hepatol Bed Bench.* 2013;6(1):14-7. PMID 24834239.
15. Ezhumalai DG. How Big A Sample Do I Require?. *Annals of SBV.* 2017;6(1):39-41. doi: 10.5005/jp-journals-10085-6113.
16. Johnson TP, Wislar JS. Response rates and nonresponse errors in surveys [internet]. *JAMA.* 2012;307(17):1805-6. doi: 10.1001/jama.2012.3532, PMID 22550194.
17. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *PLOS Med.* 2007;4(10):1623-7. doi: 10.1371/journal.pmed.0040296.
18. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies [internet]. Vol. 370; 2007. Available from: <http://www.thelancet.com>. Available from: <http://www.plosmedicine.org> [cited 22/11/2021].
19. Langan SM, Schmidt SA, Wing K, Ehrenstein V, Nicholls SG, Filion KB, *et al.* The reporting of studies conducted using observational routinely collected health data statement for pharmacoepidemiology (RECORD-PE). *BMJ.* 2018;363:k3532. doi: 10.1136/bmj.k3532, PMID 30429167.
20. Liao D, Valliant R. Variance inflation factors in the analysis of complex survey data. *Surv Methodol.* 2012;38(1):53-62.
21. Akinwande MO, Dikko HG, Samson A. Variance inflation factor: As a condition for the inclusion of suppressor variable(s) in regression analysis. *Open J Stat.* 2015;05(7):754-67. doi: 10.4236/ojs.2015.57075.
22. Thompson CG, Kim RS, Aloe AM, Becker BJ. Extracting the variance inflation factor and other Multicollinearity Diagnostics from typical regression results. *Basic Appl Soc Psych.* 2017;39(2):81-90. doi: 10.1080/01973533.2016.1277529.
23. IMS health. Advancing academic research. IMS Institut Healthc Informatics; 2015;1-20.
24. Awaisu A, Bakdach D, Elajez RH, Zaidan M. Hospital pharmacists' self-evaluation of their competence and confidence in conducting pharmacy practice research. *Saudi Pharm J.* 2015;23(3):257-65. doi: 10.1016/j.jsps.2014.10.002, PMID 26106274.
25. Evuarherhe O, Gattrell W, White R, Winchester CC. Professional medical writing support and the quality, ethics and timeliness of clinical trial reporting: A systematic review. *Res Integr Peer Rev.* 2019;4:14. doi: 10.1186/s41073-019-0073-7. PMID 31338209.
26. Alomi YA, Alghamdi SJ, Alattyh RA. National survey of drug information centers practice: research and publication system at Ministry of Health Hospitals in Saudi Arabia. *AMDHS.* 2018;1(1):12-5. doi: 10.5530/amdhs.2018.1.5.