Reliability and Validity of EBM Resources of Pharmacy Research Questionnaire in Saudi Arabia

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ABSTRACT

Objectives: To declare reliability and validity of EBM Resources Knowledge used for Pharmacy Research Survey in Saudi Arabia. **Methods:** It is a cross-section survey developed by the authors and the researcher team. It's based on the updated literature, national and international accreditation standards organizations. The internal consistency reliability through, inter-rater reliability, item-item coloration, item-total coloration, split half reliability (Gutmann's λ6) and McDonald's ω, Cronbach alpha. The validity contained of face content validity, construct validity through exploratory factorial analysis and confirmatory factor analysis. All analysis had been done through Statistical Package of Social Sciences (SPSS), Statistical Package of Social Sciences-Analysis of Moment Structures (SPSS-Amos) and Jeffrey's Amazing Statistics Program (JASP). **Results:** A total of 209 pharmacists responded. The majority of responders were Saudi 185 (88.52%). The responders were males 108 (61.77%) and females 101 (48.33%). The three tests had been done with reliability of 16 questions. The completed number of responders (200) (mean ± SD) was 3.179 ± 0.436, McDonald's ω, Cronbach alpha and Gutmann's λ6 were 0.967, 0.966 and 0.976, respectively, inter-item coloration was 0.719, the item-total coloration >0.7, McDonald's ω, Cronbach alpha and Gutmann's λ6 value if deleted was >0.97. By using Exploratory Factor Analysis (EFA), the Kaiser-Meyer-Olkin Measure of sampling adequacy was 0.941 and Bartlett's test of sphericity with approximate chi-square was <0.001. The commonalities extraction for all questions were >0.58, the related components were one of the rotated component matrix >0.59 of all 16 questions in component 1 as suggested. They were established by confirmatory with statistically significant (p<0.001) of the factor model, by factor analysis, by scree plot, pathway analysis and fit with the original survey. The confirmatory factor index was 0.862, Tucker-Lewis Index (TLI) was 0.841, Goodness of fit index (GFI) was 0.906 and Expected cross validation index (ECVI) was 3.270. The collinearity of 16 questions was the auto-correlation was 0.066 with not statically significant (p=0.317). The majority of 16 questions had Enjuone value close to number 1, while 3 questions only had condition index more than 30. All of the 16 questions had The Variance inflation factor (VIF) less than 10 and had tolerance more than 0.1. **Conclusion:** The pharmacist survey knowledge of evidence-based medicine resources for pharmacy practice and distributed the Kingdom of Saudi Arabia had high reliability and validity scale level. The pharmacy researcher can utilized surveys with an adequate number of sample sizes with further research in Saudi Arabia.
Key words: Reliability, Validity, EBM, Resources, Knowledge, Pharmacy, Research, Saudi Arabia.

INTRODUCTION

Over the past years, pharmacy or healthcare resources developed from textbooks and journal paper types to primary or secondary and tertiary references like newly type of resources called evidence-based medicine resources. It's based on the best and high quality of method research design with meta-analysis of randomized controlled studies. The EBM resources one great to validate studies to accept or reject the pharmacy or medical recommendation. As a result, several types of research were used methods to validate their tool of collecting the data. Two concepts the researcher implemented for observations cross-sectional researches with very much used for survey distributed to target sample. The first concept called reliability "which defined as scale or test is reliable to the extent that repeat measurements made by it under constant conditions will give the same result".[1] There were several types of reliability, for instance, test-retest reliability, inter-rater reliability and the internal consistency reliability through by using biostatistical analysis. The reliability text demands to assure the accuracy of the data with got off an excellent survey that can be repeated several times with the same accuracy. The second concept used in the research called validity, "which defined as the degree to which the researcher has measured what he has set out to measure".[1] The validation procedures had various types, for instance, content and construct validity, which commonly used in practice. The construct validity needs particular training in the biostatistical software program to implement the tools. The validation process measured as a quality management tool used in the research and keep in direct specific goal without deviation, the high validity survey correlated with the question and each group of questions targets specific aim of the research.

The scientific research contained of several steps that including revision of literature. The literature with substantial evidence like meta-analysis trial and randomized controlled study to low strength evidence with case report or experience. Multiple types of resources started from evidence-based medical (EBM) references and general searching

engines. The literature review with an emphasis of EMB resources are very perilous in the pharmacy research and high demand for skills of searching all types of references.[2] Various studies discussed EBM knowledge or perception with validated survey.[3] The authors and his team have done one survey about EBM as general concept or resources of pharmacy with brief reliability and validity.[4] Besides, various publications released for undergraduate or post-graduate research without detail evidence or simple reliability and validity procedures.[5,6] There were some problems with pharmacy or medical researches with an emphasis on reliability and validity sections.[7,8] The author not away from any study about the reliability or validity survey of EBM used in pharmacy or medical research, however, some literature discussed about pharmacist perception of EBM including resources by using used previous validated survey.[6,9-12] The aim of the current study is to discover the reliability and validity of the survey for EBM used in pharmaceutical research in the Kingdom of Saudi Arabia.

METHODS

Survey Development

It is a cross-section survey developed by the authors and hit the researcher team. It's based on the updated literature, national and international accreditation standards organizations.[13-16] The survey entailed of two parts, the first section about demographic data of responders including genders, nationality with dichotomous data and age with ordinal data. The rest of the data as ordinal information that's including the responder's qualifications, background education, the board of pharmaceutical certificate and the current job and experience. The other section of demographic information was hospital data with ordinal data and included hospital bed capacity based on the ministry of health classification; the university updated hospital accreditation status from national and international accreditation institutions. The second part of the survey about patient satisfaction of pharmacy services. The section divided into several domains and each domain had several questions. The answers of the domains were likely with 1 (I do not need this knowledge), 2 (I do not have knowledge), 3 (Weak knowledge), 4 (Incomplete knowledge) and 5 (Complete knowledge). A pilot study was done through the authors and the team distributes electronically or manually to target responders 20-30 as a pilot. Sometimes they interview patients to assure all the questions clear and understood by the responders. All comments brought for discussion. The correction of the survey was done based on the agreement of most research members.[17] The research team tested the McDonald's ω and Cronbach alpha for internal reliability in the pilot responders by using Statistical Package of Social Sciences (SPSS), Statistical Package of Social Sciences-Analysis of Moment Structures (SPSS-Amos) and Jeffrey's Amazing Statistics Program (JASP).[18]

Internal Consistency Reliability

Item-item Correlation

The method was used to measure each question to another one, with high correlation results in more than 0.7, that is high internal consistency reliability survey.[1,18]

Item-total Correlation

The method was used to measure the total questions allocates with each question alone. High results more than 0.7, the high correlate internal consistency reliability of the survey.[1,18]

Split Half Reliability (Gutmann's λ6)

The method was used through the SPSS and JASP program with the scale option and reliability section for all the questions with scale or ordinal data need to be measured. The test used a split-half option. The SPSS or JASP will split the question into two half and measure the coloration of the two groups. The high results more than 0.9 of correlation means the high reliability with internal consistency.[17,19,20]

McDonald's ω, Cronbach Alpha

The research team applied McDonald's ω and Cronbach alpha for internal reliability by using SPSS and JASP. All the questions with scale or ordinal data included in the analysis. The scale more than 0.9; it will be excellent internal consistency, 0.7-0.9 means good reliability, 0.3-0.6 means not acceptable reliability and the score less than 0.3 means weak reliability.[17,21,22]

Face Content Validity

The principle authors designed the survey and research team revised self-reliantly. Each member revised all the survey content questions based on the updated literature and experience. Any violations had been sent to all research team for further discussion and agreements. The survey had been corrected and agreement from the research team. One of the team members transferred all the surveys to the Arabic language and double-checked by all team members again for content and accurate translation.[1,17]

Construct Validity

Exploratory Factorial Analysis

The method was used for the construct validity of the survey. The factor was used univariate description and Kaiser-Myer-Olin measure of sampling adequacy and Bartlett's test sphericity. The extraction used principal components analysis, the Eigen values greater than (1) with the maximum iteration of convergence (25) and display through un-rotated faction solution and scree plot. The rotation used Varimax.[15,20]

Confirmatory Factor Analysis

The test was done through SPSS-Amos and JASP software programs with factor variances, R-Sequated, fit measurements, factor loading, without emulation, error calculated with CI 95% and robust method, it was with the auto-estimator and without standardization, it was with pathway analysis.[15,20]

Collinearity

The test was done through JASP with linear regression for collinearity diagnostics including Eigen value and condition index, the coefficient used with CI 95% tolerance and variance inflation factor, the model fit through ANOVA and autocorrelation with Durbin-Watson.[23]

Statistical Analysis

Various biostatical analysis was done in the current study like the McDonald's ω, Cronbach alpha and Gutmann's λ6 for calculation reliability. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity with approximate chi-square for Exploratory Factor Analysis (EFA). The factor variances, R-Sequated, fit measurements, factor loading, without emulation, error calculated with CI 95% and robust method, it was with the auto-estimator and without standardization, it was with scree plot and pathway analysis. Collinearity had been diagnostician through linear regression the variance inflation factor was calculated, the model fit through ANOVA and auto-correlation with Durbin-Watson. All biostatical analysis was done by the Statistical Package of Social Sciences (SPSS), SPSS-AMOS and Jeffrey's Amazing Statistics Program (JASP).

RESULTS

A total of 209 pharmacists responded. The majority of responders were Saudi 185 (88.52%). The among responders were males 108 (61.77%)

Table 1: Scale Reliability Statistics.

								95.0% Confidence Interval	
	mean	sd	McDonald's ω	Cronbach's α	Gutmann's λ6	Greatest lower bound	Average inter-item correlation	Lower	Upper
scale	3.179	0.436	0.967	0.966	0.976	0.984	0.642	0.959	0.972
	Note. Of the observations, 200 were used, 10 were excluded pairwise and 210 were provided.								
	3.254	0.320	0.977	0.976	0.991	0.984	0.719	0.962	0.987
	Note. Of the observations, 29 were used, 1 were excluded pairwise and 30 were provided								

Item Reliability Statistics

		200 responders			If item dropped			29 responders			If item dropped		
		mean	sd	item-rest correlation	McDonald's ω	Cronbach's α	Gutmann's λ6	mean	sd	item-rest correlation	McDonald's ω	Cronbach's α	Gutmann's λ6
Q1	Medline or Pubmed	4.048	1.039	0.591	0.968	0.967	0.976	4.167	1.085	0.608	0.979	0.977	0.991
Q2	CINAHL	2.976	1.024	0.725	0.966	0.965	0.973	2.967	1.066	0.723	0.977	0.976	0.991
Q3	EBSCO	3.034	1.114	0.809	0.964	0.963	0.973	3.133	1.279	0.935	0.974	0.973	0.989
Q4	Ovid	3.125	1.185	0.848	0.964	0.963	0.973	3.267	1.258	0.914	0.975	0.973	0.989
Q5	Science Direct	3.293	1.242	0.841	0.964	0.963	0.973	3.400	1.303	0.929	0.974	0.973	0.989
Q6	Springer database	3.120	1.150	0.843	0.964	0.963	0.973	3.300	1.291	0.839	0.976	0.975	0.990
Q7	Sage database	2.894	1.028	0.830	0.964	0.963	0.972	3.167	1.234	0.918	0.974	0.973	0.989
Q8	ProQuest	2.847	1.036	0.812	0.964	0.964	0.973	3.100	1.213	0.911	0.975	0.974	0.989
Q9	Clinical Key	2.990	1.106	0.838	0.964	0.963	0.972	3.000	1.114	0.910	0.975	0.974	0.989
Q10	Dynamed Plus	3.115	1.142	0.762	0.965	0.964	0.974	3.167	1.262	0.804	0.976	0.975	0.991
Q11	Willy online library	3.105	1.143	0.873	0.963	0.962	0.973	3.133	1.306	0.927	0.974	0.973	0.989
Q12	Web of Science ISI	2.928	1.086	0.818	0.964	0.963	0.972	2.897	1.113	0.820	0.976	0.975	0.990
Q13	Scopus	2.942	1.132	0.822	0.964	0.963	0.972	3.067	1.285	0.901	0.975	0.974	0.990
Q14	BMJ	3.399	1.262	0.778	0.965	0.964	0.973	3.300	1.264	0.818	0.976	0.975	0.990
Q15	Google Scholar	3.761	1.221	0.655	0.967	0.966	0.975	3.800	1.375	0.658	0.978	0.977	0.992
Q16	Cochrane Library	3.287	1.190	0.751	0.966	0.964	0.974	3.200	1.186	0.795	0.976	0.975	0.989

and females 101 (48.33%). Most of the responders were in age (18-29) years and age (30-44) years were 104 (49.67%) and 78 (37.32%), respectively. The majority of responders had a doctor of pharmacy and a Bachelor's degree in pharmacy was 92 (44.32%) and 81 (38.94%), respectively. Most of the pharmacists had not 16 (8%) certified of pharmaceuticals specialties 193 (92%).

Reliability

The three tests had been done of reliability with 16 questions for the initial (29) responders mean ± SD was 3.254 ± 0.320 and McDonald's ω, Cronbach alpha and Gutmann's λ6 were 0.977, 0.976 and 0.991, respectively, while inter-item coloration was 0.642. After the completed number of responders (200), the tests mean ± SD was 3.179 ± 0.436, McDonald's ω, Cronbach alpha and Gutmann's λ6 were 0.967, 0.966 and 0.976, respectively and inter-item coloration was 0.719 among the 30 responders. All the questions of item-total coloration >0.6, the McDonald's ω, Cronbach alpha and Gutmann's λ6 value if deleted was >0.97, while with responders number (200), the item-total coloration >0.7, McDonald's ω, Cronbach alpha and Gutmann's λ6 value if deleted was >0.97 (Table 1). The Split-half reliability of 200 valid cases and 16 items; the Cornbrash's alpha of part 1 was 0.938, while part 2 was 0.938, the correlation between forms was 0.924. The Spearman-Brown Coefficient of equal length was 0.960 and Guttman Split-Half Coefficient was 0.960 (Table 2).

Validity

By using Exploratory Factor Analysis (EFA), the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.941 and Bartlett's test of sphericity with approximate chi-square was <0.001 (Table 2). The commonalities extraction for all questions was >0.58, the related components were one with the rotated component matrix >0.59 of all the 16 questions in component 1 as suggested and discovered by scree plot (Figure 1). They were confirmed by confirmatory with statistically significant (p<0.001) of the factor model, by pathway analysis and fit with the original survey. The confirmatory factor index was 0.862, Tucker-Lewis Index (TLI) was 0.841, Goodness of fit index (GFI) was 0.906 and Expected cross validation index (ECVI) 3.270. Other results Bentler-Bonett Non-normed Fit Index (NNFI) was 0.841, Bentler-Bonett Normed Fit Index (NFI) was 0.836, Parsimony Normed Fit Index (PNFI) was 0.725, Bollen's Relative Fit Index (RFI) was 0.811, Bollen's Incremental Fit Index (IFI) 0.863, Relative Noncentrality Index (RNI) was 0.862, Root mean square error of approximation (RMSEA) was 0.148 and Standardized root mean square residual (SRMR) was 0.054 (Table 3 and 4). The square, multiple correlations of the questions R2 were from 0.326 to 0.813, while factor loading was all the questions >0.599 and it was a range (0.599-1.057) with p <0.001. In the pathway analysis that's each latent factor and observed coloration with >0.7 with p <0.001 as explored in pathway analysis (Figure 2).

Collinearity

The correlation coefficients of 16 questions was R2 (0.901) and RMSE was (0.376) with statistically significant (p<0.001), while the auto-correlation was 0.066 with not statically significant (p=0.317). The majority of the 16 questions had Enjuone value close to number 1, while 3 questions

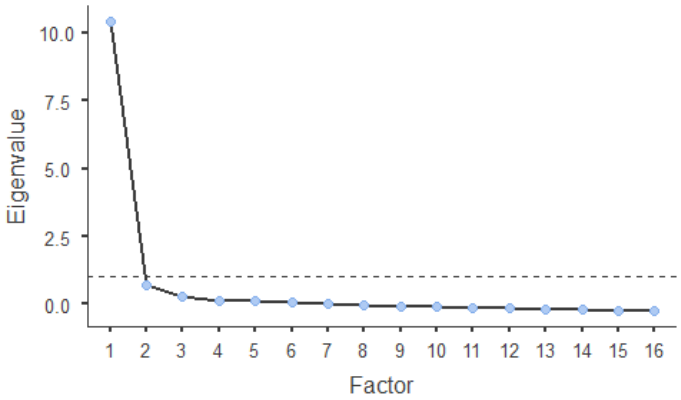

Figure 1: Exploratory Factor Analysis Scree Plot.

Table 2: Split half reliability.

Case Processing Summary			
		N	%
Cases	Valid	200	95.2
	Excluded[a]	10	4.8
	Total	210	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics			
Cronbach's Alpha	Part 1	Value	.938
		N of Items	8[a]
	Part 2	Value	.936
		N of Items	8[b]
	Total N of Items		16
Correlation Between Forms			.924
Spearman-Brown Coefficient	Equal Length		.960
	Unequal Length		.960
Guttman Split-Half Coefficient			.960
a. The items are: Medline or Pubmed, CINAHL, EBSCO, Ovid, Science Direct, Springer database, Sage database, ProQuest.			
b. The items are: ClinicalKey, Dynamed Plus, Willy online library, Web of Science ISI, Scopus, BMJ, Google Scholar, Cochrane Library.			

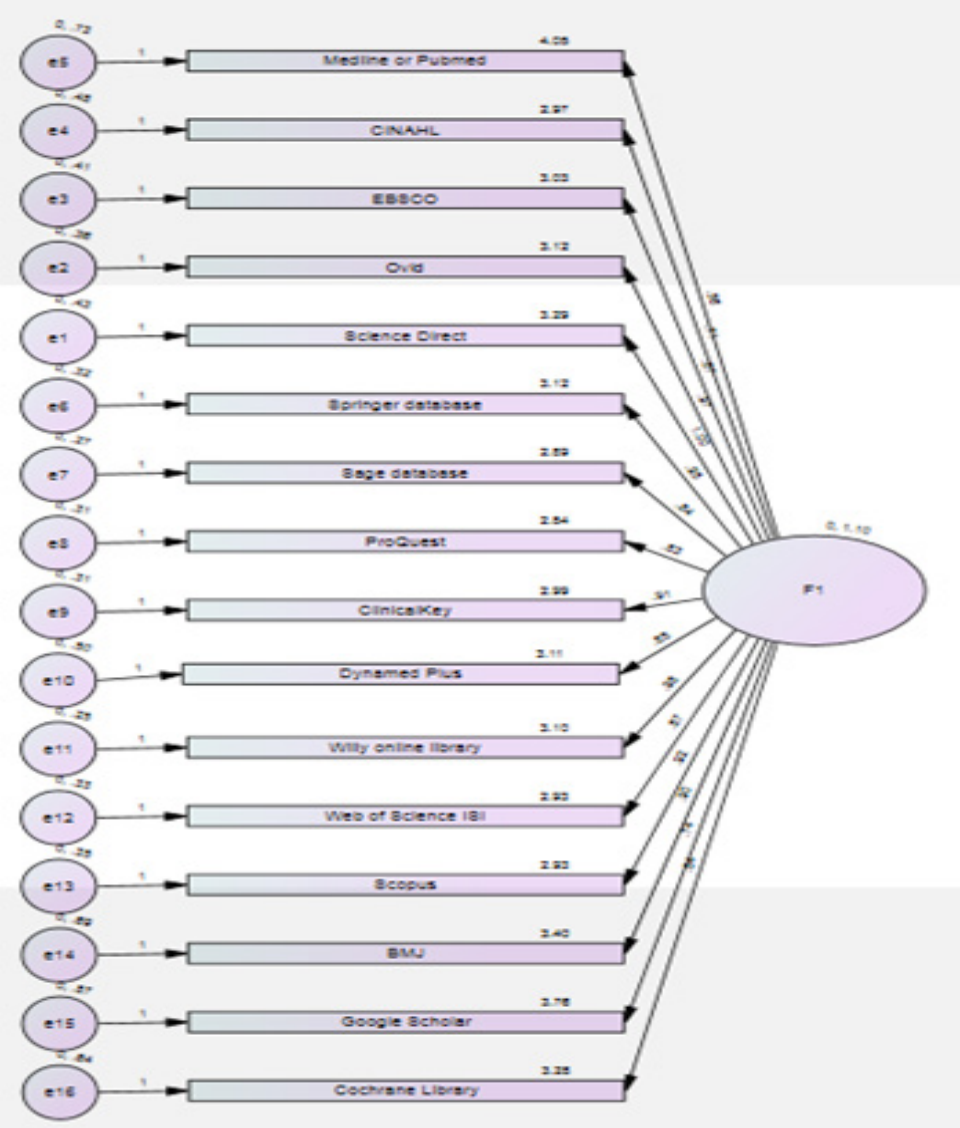

Figure 2: Confirmatory analysis pathway diagram.

Table 3: Scale of Validity.

Exploratory Factor Analysis (EFA)				Confirmatory Factor Analysis (CFA)			
KMO and Bartlett's Test							
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.941	**CFI**	0.862			
Bartlett's Test of Sphericity	Approx. Chi-Square	3282.416	Chi-square test				
	df	120	Baseline model	3387.385	120		P
	Sig.	< .001	Factor model	554.808	104		< .001
	Communalities	**Factor loading**	**Squared Multiple Correlations**	**Factor loading (F1)**	**95% Confidence Interval**		
Items	**Extraction**	**Component**	**R^2**				**p**
		1			**Lower**	**Upper**	
Medline or Pubmed	.768	0.594	0.326	0.599	0.484	0.714	< .001
CINAHL	.585	0.744	0.544	0.754	0.640	0.868	< .001

EBSCO	.714	0.831	0.681	0.923	0.818	1.028	< .001
Ovid	.757	0.862	0.742	1.028	0.937	1.118	< .001
Science Direct	.759	0.857	0.725	1.057	0.965	1.149	< .001
Springer database	.770	0.862	0.757	1.008	0.916	1.100	< .001
Sage database	.818	0.854	0.752	0.896	0.803	0.989	< .001
ProQuest	.792	0.840	0.723	0.887	0.786	0.989	< .001
ClinicalKey	.786	0.858	0.749	0.964	0.865	1.064	< .001
Dynamed Plus	.655	0.783	0.619	0.904	0.795	1.012	< .001
Willy online library	.820	0.895	0.813	1.041	0.959	1.122	< .001
Web of Science ISI	.762	0.839	0.716	0.919	0.811	1.027	< .001
Scopus	.751	0.842	0.728	0.974	0.877	1.071	< .001
BMJ	.800	0.786	0.579	0.967	0.863	1.071	< .001
Google Scholar	.670	0.658	0.413	0.790	0.664	0.915	< .001
Cochrane Library	.704	0.757	0.546	0.888	0.771	1.005	< .001
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.							
a. Rotation converged in 3 iterations.							

Table 4: The validity analysis test.

Index	Value	normal value
Comparative Fit Index (CFI)	0.862	>0.9
Tucker-Lewis Index (TLI)	0.841	>0.9
Bentler-Bonett Non-normed Fit Index (NNFI)	0.841	>0.9
Bentler-Bonett Normed Fit Index (NFI)	0.836	>0.9
Parsimony Normed Fit Index (PNFI)	0.725	>0.9
Bollen's Relative Fit Index (RFI)	0.811	>0.9
Bollen's Incremental Fit Index (IFI)	0.863	>0.9
Relative Noncentrality Index (RNI)	0.862	>0.9
Root mean square error of approximation (RMSEA)	0.148 CI 90% (0.163-0.160) P<0.001	> or = 0.08
Standardized root mean square residual (SRMR)	0.054	> 0.04
Hoelter's critical N (α = .05)	47.200	
Hoelter's critical N (α = .01)	51.380	
Goodness of fit index (GFI)	0.906	>0.9
McDonald fit index (MFI)	0.322	
Expected cross validation index (ECVI)	3.270	<5

only had condition index more than 30. All of the 16 questions had the Variance inflation factor (VIF) less than 10 and had tolerance more than 0.1 (Table 5).

DISCUSSION

The evidence-based medicine was playing a noteworthy role in pharmacy practice.[2] The pharmacist utilized evidence-based medicine during drug information resources and pharmacy research.[24] The authors and his colleagues conducted the study of pharmacists' knowledge about evidence-based medicine references in pharmacy research. The study was a cross-sectional survey distributed to the pharmacists. The author did some tools of reliability and validity briefly.[4] However, the details of reliability or validity for the survey of the knowledge of EBM resources used in pharmacy research had been done in the current study. The results showed in the pilot study of 30 responders with three different reliability tests was excellent and once repeated with completed responders, was also excellent with exceedingly more 0.97. The inter-item correlation or item-total coloration was right in the primary pilot responders and completed responders means the question of internal consistency was high reliable. The findings of the validity test showed a good sample size for exploratory factor analysis. The EFA recommends one factor with 16 questions with proper extraction and rotated component matrix. It's confirmed by CFA with one factor with statistical significance through a regression model, scree plot and pathway analysis. The findings showed that there is no collinearity with all the 16 questions except three-question might affect the validity of the survey. However, by increasing the number of responders will remove all collinearity related issues. The survey of knowledge about EBM resources used for pharmacy research was high reliability and validity. This is the first investigation that was done in the Kingdom of Saudi Arabia or the Gulf and Middle East countries.

CONCLUSION

The assessment of pharmacist knowledge with evidence-based medicine resources used in pharmacy research with a specific survey distributed in the Kingdom of Saudi Arabia. It was done through the reliability of

Table 5: The Collinearity analysis test.

Collinearity								95% CI			
	Eigenvalue	Condition Index	Unstandardized	Standard Error	Standardized	t	p	lower	upper	Tolerance	VIF
Q1	15.397	1.000	0.207	0.032	0.708	6.573	< .001	0.145	0.269	0.464	2.156
Q2	0.126	11.036	0.113	0.048	0.374	2.348	0.020	0.018	0.207	0.283	3.529
Q3	0.071	14.712	-0.050	0.048	-0.183	-1.049	0.295	-0.145	0.044	0.245	4.081
Q4	0.058	16.296	0.056	0.047	0.218	1.193	0.234	-0.037	0.149	0.225	4.449
Q5	0.055	16.757	-0.090	0.046	-0.364	-1.976	0.050	-0.180	-1.169e-4	0.219	4.559
Q6	0.052	17.210	0.036	0.050	0.136	0.716	0.475	-0.063	0.135	0.208	4.803
Q7	0.044	18.706	0.124	0.062	0.416	2.001	0.047	0.002	0.246	0.172	5.815
Q8	0.036	20.725	-0.055	0.055	-0.188	-1.015	0.312	-0.163	0.052	0.218	4.595
Q9	0.030	22.790	-0.062	0.053	-0.225	-1.166	0.245	-0.167	0.043	0.202	4.961
Q10	0.029	23.185	0.008	0.041	0.030	0.201	0.841	-0.072	0.088	0.326	3.066
Q11	0.025	24.720	0.017	0.053	0.065	0.325	0.745	-0.088	0.123	0.187	5.358
Q12	0.020	27.619	0.049	0.057	0.173	0.855	0.394	-0.064	0.162	0.182	5.483
Q13	0.018	29.375	0.012	0.056	0.044	0.210	0.834	-0.099	0.122	0.173	5.791
Q14	0.016	30.964	-0.082	0.042	-0.340	-1.943	0.053	-0.165	0.001	0.237	4.228
Q15	0.013	33.810	0.013	0.032	0.051	0.398	0.691	-0.050	0.076	0.446	2.243
Q16	0.010	38.911	0.002	0.040	0.009	0.057	0.955	-0.076	0.081	0.309	3.232

R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
0.949	0.901	0.893	0.376	0.901	104.443	16	183	< .001

ANOVA							**Collinearity** Threshold
Model	Sum of Squares	df	Mean Square	F	p		Variance inflation factor (VIF) >10
Regression	237.042	16	14.815	105.014	< .001		Tolerance > 0.1
Residual	25.958	184	0.141				Condition index (CI) > 30
Total	263.000	200					The eigenvalue (coloration matrix); if it is close to 0 collinearity is high, if it is close to 1 there is no collinearity in the data

Durbin-Watson								
Autocorrelation	Statistic	p						
0.066	1.865	0.317						

internal consistency through several bio-statistical tests. Besides, the survey had high content and constructed validity by various testes when repeated, used it in the future. The survey needs an appropriate sample size in further research in Saudi Arabia.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

KSA: Kingdom of Saudi Arabia; **CFI:** Comparative Fit Index; **TLI:** Tucker-Lewis Index; **NNFI:** Bentler-Bonett Non-normed Fit Index; **NFI:** Bentler-Bonett Normed Fit Index; **PNFI:** Parsimony Normed Fit Index; RFI: Bollen's Relative Fit Index; **IFI:** Bollen's Incremental Fit Index; **RNI:** Relative Noncentrality Index; **RMSEA:** Root Mean Square Error of Approximation; **SRMR:** Standardized Root Mean Square Residual; **GFI:** Goodness of Fit Index; **MFI:** McDonald Fit Index; **ECVI:** Expected Cross Validation index; **SPSS:** Statistical Package of Social Sciences; **JASP:** Jeffrey's Amazing Statistics Program; **ANOVA:** Analysis of

Variance; **SPSS-Amos:** Statistical Package of Social Sciences-Analysis of Moment Structures.

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