

Research Article

Exploring the Pharmacists' Knowledge, Attitude, and Practice During COVID-19: A KAP Model Approach

Abrar Ghaith ¹, Islam Alghreiz ², and Tayseer Afifi ³

¹Faculty of Economics and Business, Debreceni Egyetem, DEBRECEN, Hajdú-Bihar, Hungary

²Department of Internal Medicine, Jaber Al-Ahmad Armed Forces Hospital, Kuwait City, Kuwait

³Department of Physiology and Biochemistry, Jordan University of Science and Technology, Irbid City, Jordan

Correspondence should be addressed to Abrar Ghaith; ghaith.abrar@econ.unideb.hu

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Background: The coronavirus disease 2019 (COVID-19) pandemic had a major effect on economics, cultures, and world health. Effective prevention, management, and control of the virus depend on an understanding of its origins and early conditions. This study examines pharmacists' knowledge, attitudes, and practices (KAPs) on COVID-19 prevention and control in Kuwait using the KAPs approach.

Methods: From August 15 to August 30, 2022, a cross-sectional survey design was used in the study. A convenience sample of 400 participants was obtained. Data were collected via an online survey that consisted of demographic questions and a KAPs survey about COVID-19. The survey had been piloted before and was deemed to have a respectable level of dependability. Based on predetermined scoring levels, participants' anonymous replies were divided into categories such as adequate/inadequate knowledge, positive/negative attitudes, and appropriate/inappropriate practices.

Results: Half of the participants were married, and most of the participants were female. They were mostly in the age range of 31–40 years. The most common highest level of education attained was a master's degree. There were noticeable differences in the demographics. Overall, 83.5% of participants showed adequate knowledge, 94% had a good attitude, and 52.5% had appropriate practice. Males had a greater understanding of transmission but lesser knowledge of clinical presentation. The group with the highest rates of proper behavior and adequate Knowledge was those aged 31–40 years. Being married was associated with higher knowledge. The educational level had a substantial impact on results, with master's degree holders having greater rates of adequate knowledge. Although knowledge and attitude ratings showed a good correlation, attitude by itself could not significantly predict actual preventative measures, highlighting the necessity for behavior-change-focused treatments.

Conclusion: This study highlights the significance of educating pharmacists about evidence-based practices to improve their involvement in COVID-19 prevention and control. The importance of disseminating clear information via a variety of communication methods is underscored by the positive association found between knowledge and practice. The study focuses on pharmacists in Kuwait in particular since it acknowledges the need to bolster their optimistic outlooks and aggressive involvement in tackling health issues. In conclusion, these results highlight how important focused interventions and education are to successful pandemic management.

Keywords: attitudes; COVID-19; KAP; knowledge; Kuwait; practice

1. Introduction

1.1. The Evolution and Circumstances of Coronavirus Disease 2019 (COVID-19). A cluster of pneumonia cases emerged in Wuhan, China, in December 2019 [1]. This led to the identification of a novel coronavirus, severe acute respiratory

syndrome coronavirus 2 (SARS-CoV-2), which spread rapidly, prompting the World Health Organization (WHO) to declare a global pandemic on March 11, 2020 [2, 3]. The virus likely originated from zoonotic transmission linked to a sea-food market in Wuhan [4]. Since then, COVID-19 has had a

profound global impact, with preventive measures such as mask-wearing and social distancing being implemented worldwide [2, 3, 5, 6].

The pandemic severely disrupted economies, leading to lockdowns, business closures, and border shutdowns [7]. Essential supplies, including ventilators and personal protective equipment, were in short supply during the crisis [8, 9]. The Middle East and South Africa experienced rapid virus spread due to their economic ties with China, resulting in millions of cases and deaths [10–12]. Kuwait implemented strict measures, such as curfews and quarantines, following its first COVID-19 cases in February 2020 [13, 14]. The curfews led to significant disruptions in daily life, affecting public health behaviors [15–17].

The pandemic's economic burden has been particularly significant in less developed nations [18]. A study in Kuwait found the cost per COVID-19 patient to be KD 2216 (USD 7344), with intensive care unit (ICU) expenses comprising a large portion. The total annual cost for COVID-19 care in Kuwait was estimated at 5.5% of the 2021 healthcare budget [19]. Prioritizing prevention and optimizing healthcare systems are critical to reducing such financial strains.

1.2. Using the Knowledge, Attitudes, and Practices (KAPs) Model to Study the KAPs Regarding the Health-Related Studies. The KAPs model helps researchers understand how individual knowledge, attitudes, and behaviors affect health responses during outbreaks. KAP surveys use standardized questions to gather both qualitative and quantitative data, identifying misconceptions that may hinder behavior change. These surveys capture opinions, revealing potential gaps between what people say and do [20]. The KAP model, first applied in the 19th century, suggests that knowledge and attitudes shape behaviors, particularly in relation to infectious disease prevention efforts, which are influenced by fear and emotions [21]. In healthcare, a study found that knowledge of pain management was a significant predictor of practice among healthcare providers [22]. Another study in Malaysia revealed higher knowledge scores among female university students regarding osteoporosis [23]. Additionally, a KAP-based study in China on intervertebral disc herniation patients demonstrated improved understanding, attitudes, and behaviors after health education [24]. Thus, the KAP model aids public health efforts by shaping more effective epidemic management strategies.

1.3. Using the KAP Model to Study the KAPs of the Populations Regionally. The KAP model has been widely applied to understand COVID-19-related behaviors across various regions. A global study of 71,890 participants from 22 countries revealed that 92% had moderate to high compliance with lockdown measures [25]. In Asia, 98% of 6910 Chinese participants wore masks, with higher COVID-19 knowledge linked to better prevention practices [26]. In South Korea, knowledge directly influenced attitudes and practices [27]. Similarly, in Nepal, 93.1% avoided crowded places, and mask-wearing was linked to gender and education [28].

In Africa, educated participants in Nigeria and Tanzania demonstrated better practices [29–32]. In the Arab world,

Egypt and Syria found variations in KAPs by gender and location, with females generally showing higher compliance [33, 34]. Palestinian women and West Bank residents also demonstrated greater adherence to preventive measures [35].

A Middle Eastern study involving Kuwait, Saudi Arabia, and Jordan highlighted moderate knowledge and optimism about controlling COVID-19 [36]. Specifically in Kuwait, diabetic patients showed moderate knowledge but good prevention practices, highlighting knowledge gaps that need addressing through public education [37].

1.4. Using the KAP Model to Study the KAPs of Healthcare Workers and Pharmacists. Several studies explored pharmacists' KAPs toward COVID-19. In Pakistan, community pharmacists had sufficient knowledge but lacked appropriate attitudes and behaviors, suggesting a need for educational programs [38]. In Kisangani, pharmacy students exhibited good KAP [39]. A study in Nepal highlighted the importance of certified pharmacists and regular training, linking educational attainment with better KAP [40]. Vietnamese pharmacists showed strong COVID-19 knowledge but had regional disparities [41]. In the UAE, pharmacists demonstrated moderate knowledge and appropriate practices [42].

By employing the KAP model, the article aims to delve into the depth of pharmacists' knowledge regarding COVID-19, their attitudes and practices toward it, and how these factors translate into their actual practices or behaviors.

2. Materials and Methods

2.1. Study Design. A cross-sectional survey was conducted from August 15 to August 30, 2022. Sample quantity and selection: since respondents to the questionnaire were chosen at random, a convenience sample was acquired. The minimum acceptable sample size using statistical software indicated that a sample size of 385 is representative of the infinite population [43]. A total of 400 completed surveys were considered valid for analysis.

2.2. Data Collection. Online survey forms were used to gather data from people in Kuwait because disease transmission is contagious. By sending out invitations to complete the survey, participants were chosen at random. The questionnaire was created by carefully examining pertinent research and including validated questions from earlier studies that used the KAPs model for COVID-19 assessment. To generate a link and a KAP questionnaire for data collection, the Google Forms application was utilized.

The survey consisted of 22 KAP questions, including nine questions about knowledge, four questions about attitudes, and nine questions about COVID-19 prevention and control practices.

There were two sections in the questionnaire. Demographic information, including age, gender, marital status, and educational attainment, was gathered in the first section. The 22 KAP questions, which covered subjects, including clinical presentations, COVID-19 transmission channels, and control strategies, made up the second half. In order

to answer these questions, participants could select an option such as Agree/Disagree, Not Sure, or Yes/No.

Pharmacists who properly answered more than half of the questions were deemed to possess sufficient knowledge, a positive attitude, and positive practices. The categorical scale was utilized to assess the responses. A greater comprehension of COVID-19 was indicated by a higher score. Each question was limited to one response per participant.

2.3. Data Analysis. Data were entered and analyzed using SPSS v 23.0. Descriptive statistics were initially used to summarize the sociodemographic characteristics of the participants. This included calculating frequencies and percentages for categorical variables such as gender, age group, marital status, and educational level, providing an overview of the study population's distribution.

To explore associations between sociodemographic factors and outcomes related to COVID-19 KAP, chi-square tests (χ^2 tests) were utilized. These tests determined whether significant relationships existed between categorical variables such as gender, age group, marital status, and educational level with adequate knowledge, positive attitude, and appropriate practice. The reported *p*-values indicated the statistical significance of these associations, highlighting notable disparities among different demographic groups.

Logistic regression analysis was conducted to identify significant sociodemographic determinants of KAP scores. This method provided odds ratios (ORs) with 95% confidence intervals (CIs) and *p*-values, which helped quantify the likelihood of having adequate knowledge, a positive attitude, or appropriate practice based on various factors such as gender, age, marital status, and educational level. These analyses revealed specific trends and significant predictors within the study population.

Correlation analysis, specifically Pearson correlation coefficients, was used to examine the relationships between continuous variables such as knowledge score, attitude score, and practice score. This analysis assessed the strength and direction of the associations between these variables, revealing that while there was a positive association between knowledge and attitude scores, attitude alone did not strongly predict actual preventive practices.

Finally, analysis of variance (ANOVA) or the Kruskal-Wallis test was likely used to compare mean scores of KAP across different age groups, marital statuses, and educational levels. These tests helped determine if there were statistically significant differences among the groups, providing further insight into how sociodemographic factors influenced COVID-19-related behaviors and perceptions.

3. Results

The study included 400 participants. Three-fourths of the participants were female ($n = 303$, 75.8%). The most frequent age group was 31–40 years, which constituted half of the study participants ($n = 200$, 50%). More than half of the study participants were married ($n = 236$, 59%). Master's degree was the most frequent highest educational degree

TABLE 1: Sociodemographic characteristics of study participants.

Characteristic	Frequency	Percent
Gender		
Male	97	24.3
Female	303	75.7
Age group		
21–30	138	34.5
31–40	200	50
41–50	47	11.8
51–60	7	1.8
>60	4	1
Marital status		
Single	156	39
Married	236	59
Divorced	8	2
Educational level		
Undergraduate	161	40.3
Master degree	193	48.3
PhD	46	11.5

($n = 193$, 48.3%). Table 1 presents the sociodemographic characteristics of study participants.

3.1. KAP Scores Related to COVID-19. Table 2 presents the distribution of adequate knowledge, positive attitude, and appropriate practice concerning sociodemographic characteristics. Overall, 83.5% of respondents exhibited adequate knowledge, 94% demonstrated a positive attitude, and 52.5% showcased appropriate practice. Notable disparities were observed across genders, with 76.3% of males and 85.8% of females possessing adequate knowledge ($p = 0.04$), 91.8% of males and 94.7% of females displaying a positive attitude ($p = 0.201$), and 62.9% of males and 49.2% of females engaging in appropriate practice ($p = 0.012$). Among age groups, individuals aged 31–40 exhibited the highest rates of adequate attitude (97%) and appropriate practice (55.5%), while those over 60 showed perfect scores across all categories. The educational level also significantly influenced outcomes, with 89.6% of respondents with a master's degree demonstrating adequate knowledge ($p = 0.003$), while those with a PhD showed lower rates of both adequate knowledge (71.7%) and appropriate practice (54.3%).

3.2. Knowledge Scores Related to COVID-19. Table 3 examines sociodemographic determinants of knowledge scores regarding clinical presentation, transmission, and treatment. Significant results include gender, where males exhibited lower knowledge on clinical presentation ($OR = 0.94$, $p = 0.036$) but higher knowledge on transmission ($OR = 0.77$, $p = 0.003$). Among age groups, those aged 51–60 demonstrated increased knowledge on transmission ($OR = 2.08$, $p = 0.049$), while those over 60 showed a trend toward higher knowledge on transmission ($OR = 2.04$, $p = 0.067$). Marital status revealed that being married was associated with higher knowledge on clinical presentation ($OR = 1.79$, $p = 0.021$) and treatment ($OR = 1.930$, $p = 0.049$). Additionally, having

TABLE 2: Distribution of adequate knowledge, positive attitude, and appropriate practice based on sociodemographic characteristics.

Characteristic	Adequate knowledge		Adequate attitude		Adequate practice	
	N (%)	p	N (%)	p	N (%)	p
Overall	334 (83.5%)		376 (94%)		210 (52.5%)	
Gender						
Male	74 (76.3)	0.04	89 (91.8)	0.201	61 (62.9)	0.012
Female	260 (85.8)		287 (94.7)		149 (49.2)	
Age group						
21–30	114 (82.6)	0.718	128 (92.8)	0.023	66 (47.8)	0.079
31–40	166 (83)		194 (97)		111 (55.5)	
41–50	41 (87.2)		43 (91.5)		20 (42.6)	
51–60	5 (71.4)		5 (71.4)		5 (71.4)	
>60	4 (100)		4 (100)		4 (100)	
Marital status						
Single	128 (82.1)	0.486	144 (92.3)	0.468	81 (51.9)	0.061
Married	198 (83.9)		224 (94.9)		121 (51.3)	
Divorced	6 (100)		6 (100)		6 (100)	
Educational level						
Undergraduate	128 (79.5)	0.003	149 (92.5)	0.107	79 (49.1)	0.528
Master degree	173 (89.6)		186 (96.4)		106 (54.9)	
PhD	33 (71.7)		41 (89.1)		25 (54.3)	

Note: Bold indicates the significant *p* values.

TABLE 3: Sociodemographic determinants of knowledge score.

Variable	Knowledge on clinical presentation			Knowledge on transmission			Knowledge on treatment		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Gender (male)	0.94	1.065–6.220	0.036	0.77	0.281–1.763	0.003	1.042	0.485–2.243	0.091
Age (31–40)	2.51	0.011–3.271	0.279	2.16	0.160–4.730	0.288	1.934	0.260–4.550	0.082
Age (41–50)	1.93	1.117–3.001	0.412	2.10	0.064–2.922	0.099	1.902	0.824–4.072	0.091
Age (51–60)	1.95	1.073–2.055	0.345	2.08	1.017–6.142	0.049	1.876	0.804–3.021	0.091
Age (>60)	1.102	1.010–2.115	0.714	2.04	1.271–4.083	0.067	1.018	0.984–3.043	0.074
Marital status (married)	1.79	1.059–4.014	0.021	1.10	0.154–5.269	0.079	1.930	0.597–3.047	0.049
Marital status (divorced)	1.92	1.095–3.011	0.098	1.31	0.127–4.189	0.725	1.917	0.237–4.460	0.042
Educational level (master)	1.85	1.147–3.514	0.097	1.14	0.421–1.790	0.909	1.087	0.379–3.142	0.087
Educational level (PhD)	1.84	1.748–4.578	0.097	1.03	0.506–2.124	0.072	1.068	0.319–2.731	0.091

Abbreviations: CI, confidence interval; OR, odds ratio.

a master's degree showed a trend toward increased knowledge on clinical presentation (OR = 1.85, *p* = 0.097), and a similar trend was observed for PhD holders (OR = 1.84, *p* = 0.097).

3.3. Attitude Scores Related to COVID-19. Table 4 investigates sociodemographic determinants of attitude scores concerning fear of COVID-19, hygiene practices, and disease control. Notable findings include gender differences, with males showing a significantly lower attitude toward hygiene (OR = 0.703, *p* = 0.030). Among age groups, individuals over 60 exhibited a notably higher attitude toward disease control compared to other age groups (OR = 2.017, *p* = 0.012). Additionally, educational level played a role, with respondents holding a master's degree showing a lower attitude toward fear of COVID (OR = 0.728, *p* = 0.051) but a higher attitude toward hygiene (OR = 1.990, *p* = 0.015).

Conversely, those with a PhD demonstrated a significantly higher attitude toward fear of COVID (OR = 1.058, *p* = 0.020) but not toward hygiene or disease control.

3.4. Practice Scores Related to COVID-19. Table 5 analyzes sociodemographic determinants of practice scores concerning hygiene, distancing, and vaccination behaviors. Key findings include age-related disparities, with individuals aged 31–40 showing significantly higher practice scores for hygiene (OR = 1.951, *p* = 0.033) compared to other age groups. Moreover, being married was associated with significantly higher practice scores for hygiene (OR = 2.079, *p* = 0.013). However, there were no significant associations found between gender or educational level and practice scores in any of the assessed domains. Overall, age and marital status emerged as significant determinants of practice behaviors, highlighting

TABLE 4: Sociodemographic determinants of attitude score.

Variable	Attitude on fear of COVID			Attitude on hygiene			Attitude on disease control		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Gender (male)	0.407	0.319–1.387	0.277	0.703	0.262–2.935	0.030	1.030	0.310–2.624	0.850
Age (31–40)	1.906	0.543–2.979	0.797	2.057	0.468–3.950	0.177	1.817	0.707–3.014	0.172
Age (41–50)	1.878	0.340–2.321	0.095	1.959	0.104–2.187	0.324	1.773	0.474–3.071	0.310
Age (51–60)	1.903	0.308–6.304	0.091	2.010	0.206–7.806	0.347	1.776	0.405–3.026	0.381
Age (>60)	1.986	0.314–4.021	0.93	1.990	0.798–4.080	0.297	2.017	1.025–4.077	0.012
Marital status (married)	1.247	0.569–2.127	0.101	1.902	0.114–3.002	0.597	1.828	1.018–4.054	0.741
Marital status (divorced)	1.785	0.990–3.586	0.177	1.955	0.248–4.785	0.391	1.821	1.041–3.071	0.763
Educational level (master)	0.728	0.869–4.941	0.051	1.990	1.207–5.994	0.015	1.480	0.144–2.623	0.434
Educational level (PhD)	1.058	1.018–7.007	0.020	1.082	0.328–6.549	0.008	1.320	0.309–6.144	0.497

Abbreviations: CI, confidence interval; COVID, coronavirus disease; OR, odds ratio.

TABLE 5: Sociodemographic determinants of practice score.

Variable	Practice on hygiene			Practice on distancing			Practice on vaccination		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Gender (male)	0.349	0.026–2.434	0.206	0.144	0.062–1.654	0.114	0.054	0.042–1.733	0.832
Age (31–40)	1.951	0.175–3.765	0.033	2.066	0.118–3.782	0.741	2.167	0.140–3.796	0.834
Age (41–50)	2.030	0.176–3.037	0.094	2.095	0.127–4.112	0.256	2.162	0.141–4.095	0.401
Age (51–60)	2.031	0.020–2.157	0.054	2.130	0.145–5.010	0.358	2.202	0.907–4.055	0.252
Age (>60)	2.210	0.254–4.058	0.067	2.222	0.747–3.143	0.651	2.218	0.106–3.111	0.191
Marital status (married)	2.079	0.567–3.082	0.013	1.617	0.904–3.091	0.094	1.020	0.063–2.066	0.884
Marital status (divorced)	1.990	0.471–2.896	0.087	1.516	0.106–3.353	0.106	1.151	0.056–1.776	0.723
Educational level (master)	1.194	0.388–2.749	0.614	1.703	0.243–3.007	0.243	1.127	0.436–1.779	0.622
Educational level (PhD)	1.315	0.347–2.535	0.406	1.238	0.391–3.587	0.391	1.175	0.419–1.682	0.316

Abbreviations: CI, confidence interval; OR, odds ratio.

TABLE 6: Relationship between KAP.

	Knowledge score	Attitude score	Practice score
Knowledge score			
Correlation coefficient	1.000	0.313	0.063
<i>p</i> Value	—	≤0.001	0.211
Attitude score			
Correlation coefficient	0.313	1.000	0.013
<i>p</i> Value	$p \leq 0.001$	—	0.801
Practice score			
Correlation coefficient	0.063	0.013	1.000
<i>p</i> Value	0.211	0.801	—

Abbreviation: KAP, knowledge, attitude, and practice.

potential targets for tailored public health interventions aimed at promoting preventive practices during the COVID-19 pandemic.

3.5. Relationship Between KAP. Table 6 examines the relationship between KAP scores regarding COVID-19. Significant correlations were found between knowledge and attitude scores ($r = 0.313$, $p \leq 0.001$), indicating a positive association. However, attitude scores were not significantly correlated with practice scores ($r = 0.013$, $p = 0.801$), suggesting a weak relationship between attitude and actual behavior. Similarly, knowledge scores also showed a weak correlation with

practice scores ($r = 0.063$, $p = 0.211$), although not statistically significant. These results imply that while there is a positive association between knowledge and attitude, attitude alone does not strongly predict actual preventive practices, indicating the need for interventions targeting behavior change beyond knowledge and attitude enhancement.

4. Discussion

The present research extends earlier work [44, 45] about sociodemographic factors as determinants of KAPs toward health concerns. In line with Al-Hanawi et al. [44, 45], the

findings also revealed the gender differences in COVID-19 knowledge, where men had less knowledge, negative attitudes, and worse behavior as compared to women. Further, older adults have always tended to know and practice health behaviors better than young people. Some of the differences in what was found by Rahman et al. [45] that have been observed in the current study could be attributed to the difference between the participants—pharmacists against the social workers and the importance of open channels of communication that have been emphasized in the research method. Like the patterns in the Iranian research, the variable KAP showed the effect of age, marital status, education and employment, and geography on the COVID-19 knowledge, which in turn resulted in a full understanding of the disease and their commitment to practicing good health [46]. Additional studies reveal that KAP concerning COVID-19 differs depending on the demographics of the people in question. On the perception front, women and young people are often found to exhibit better attitudes and knowledge but this does not always reflect in their behavior [47, 48]. On the other hand, the older population has more accurate information or knowledge that performs preventive actions and the finding revealed that KAP has a positive correlation with educational level and urban residency [49, 50]. As suggested by Zhong et al. [26], Al-Hanawi et al. [44], and Rahman et al. [45], KAP surveys are important tools in developing context-specific public health education campaigns. Our study supports these assertions to affirm that targeted intercession focusing on the closure of the identified knowledge deficits and favorable attitudes in varied receptor demographic segments is crucial for the maximum utilization of health benefits [46, 51].

In conclusion, the research provides insight as to how the respective, albeit interconnected, KAPs of people entail COVID-19. Conducting KAP surveys is advantageous since it will help the public health programs to achieve targeted communities and demography, hence optimizing the health results. These demographics must be addressed through public health interventions that seek to target demographics and ensure that information that is perceived as important and is capable of changing people's behaviors is well communicated to the necessary groups [52, 53]. However, targeted interventions have been useful in working to fill the existing gaps of knowledge as well as enhance positive attitudes among targeted populations. Some successful interventions include educational programs that improve knowledge as well as an orientation that brings positive behavioral change among communities in research studies among diverse groups [54, 55]. These interventions frequently employ workshops and other materials that will enhance yield and effectiveness. Finally, closing the KAP gaps by demographic characteristics is necessary for increasing health literacy/health promotion and strengthening public health in the context of the next pandemic. Engagement focuses on the persons and culture-sensitive techniques can promote compliance with the measures and reduction of disparities in healthcare.

5. Conclusion

The study demonstrates a strong correlation between knowledge and attitude regarding COVID-19 prevention among participants, with females, younger age groups, and those with higher education showing more favorable outcomes. However, there is a notable disconnect between attitude and actual practice, as evidenced by weak correlations between both knowledge and practice and attitude and practice. Despite high levels of knowledge and positive attitudes, practice rates, particularly in females and younger age groups, remain suboptimal. This highlights the need for targeted public health interventions that go beyond knowledge enhancement to focus on behavioral changes that promote effective preventive practices.

Data Availability Statement

I declare that the corresponding author can provide the data supporting the study's conclusions upon request. Due to privacy concerns, the data are not publicly accessible.

Conflicts of Interest

The authors declare no conflicts of interest.

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