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Psychometric development and practical use of questionnaires designed to assess knowledge, attitude, and practice of women regarding the use of sanitizer at home to control coronavirus disease

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Abstract

Background: This study aimed to develop and practically use a questionnaire to evaluate knowledge, attitude, and practice (KAP) of women regarding the use of sanitizers at home against coronavirus disease 2019 (COVID-19).

Methods: An online cross-sectional study was conducted among Iranian women (aged ≥18 years). The KAP items were selected based on the experts' opinions, and the scale underwent a series of validation processes, including the face, content, and construct validity, and internal consistency for reliability.

Results: The internal consistency coefficient exceeded 0.7 for KAP subunits. Exploratory factor analysis (EFA) suggested a three-factor construct for each subunit, and the results of the confirmatory factor analysis (CFA) indicated acceptable fit indices for the proposed models. Overall, 330 women (mean age: 36.78 ± 10.12 years, married: 74.2%, and bachelor's degree: 46.7%) completed the questionnaire. The level of adequate knowledge on sanitizer use, positive attitude, and good practice achieved were 87.0%, 58.5%, and 66.1%, respectively. Among demographic variables, education level and occupation showed a significant relationship ($P < 0.05$) against KAP and attitude, individually.

Conclusion: Despite the high percentage of knowledge, the participants did not get a high attitude and practice score.

Keywords: KAP, COVID-19, Perceptions, Disinfection, Validity, Iran

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Introduction

The ubiquitous respiratory infection, coronavirus disease 2019 (COVID-19), was first reported among the patients exhibiting viral pneumonia symptoms in Wuhan, China, in December 2019 (1, 2). Subsequently, the rapidly growing epidemic was declared as a global pandemic on March 11, 2020 by the World Health Organization (WHO). Since July 20, 2020, over 13.8 million confirmed cases and 590 thousand deaths have been reported globally (3, 4), and in particular, the United States as the most affected country, has reported over 10.1 million cases and 0.5 million mortalities since June 30, 2020 (5).

It is crucial to take preventive and protective measures to stop this ongoing outbreak regarding the lack of specific medication. It is demonstrated that contact with an infected person (6), breathing infected air in enclosed spaces, or touching the surfaces contaminated by the patients' respiratory droplets and secretions can be considered as the main transmission paths of COVID-19 (7, 8). Depending on the type of surfaces, the persistence time of COVID-19 is reported to be variable from hours to days (9, 10). Accordingly, besides the continual hand sanitization (11) and wearing face masks (12), the WHO recommends the proper and regular disinfection of surfaces and products as an effective means for COVID-19 prevention (13). Different forms of sanitizers, including sodium hypochlorite, alcohols, hydrogen peroxide, and calcium hypochlorite are used against the infectious agent worldwide (7).

Unfortunately, it has been found that the improper

or excessive use of sanitizers and cleaners has caused respiratory problems and other adverse effects for non-professional users such as adults and housewives (14,15). The most recent online survey in the United States has revealed that 39% of respondents have been using sanitizers unsafely against the COVID-19 (16).

The knowledge, attitudes, and practice (KAP) surveys were first applied in the 1950s to understand family planning and population studies (17). Badran defines knowledge as "the capacity to acquire, retain, and use information; a mixture of comprehension, experience, discernment, and skill" (18). Attitudes refer to "a person's natural tendency to act in a particular way under certain situations, to interpret events according to certain predispositions, or to organize opinions into coherent and interrelated structures" (19). In his research, Badran emphasizes that practices entail applying rules and knowledge, which further leads to actions (18).

Moreover, the triad of KAP is critical as they act as the main pillars of the active human lives and govern many aspects of our human societies (19). Therefore, to enable a more efficient process of awareness creation, it is essential to understand KAP levels so that programs can be customized as per the community needs through community-based rehabilitation projects.

All methods of collecting data have strengths and weaknesses. Questionnaires provide an efficient way to collect data. Collecting information on sensitive matters is useful and questionnaire is an economic way for collecting data (20). For using questionnaire, it should be valid and reliable. A valid questionnaire should ask what it intends to ask. For example, the questions should be worded so that the respondent understands the objective of the question. For this purpose, the questionnaire must be reviewed by a "content expert" during a pilot test. All uncertainties and questions should be clarified until the question is clearly understood. In addition, a reliable questionnaire should give the same answer if respondents ask the same question multiple times in a short time. Reliability will be achieved by doing a 'test-retest, i.e., administering the same questionnaire to respondents for the second time and checking the consistency of the answers. Any discrepancy in answers may be due to unclear questions, and this should be reviewed and reworded (21). So, the researchers can gather valuable information with a standard questionnaire. On the other hand, to the best of our knowledge, there is not a valid questionnaire about the KAPs of women about use of sanitizer at home to control coronavirus disease.

Regarding the above-mentioned facts and background, the study has two main objectives; first, to develop a valid questionnaire, second, to use the designed questionnaire for measuring Iranian women's KAPs towards the use of sanitizers against COVID-19 at home, because this aspect has not been studied much elsewhere. Therefore, a questionnaire was designed and used to determine the KAP of women after investigating its validity and reliability.

Materials and Methods

Study design, setting, and participants

An online exploratory cross-sectional study was conducted from May 15 to 18, 2020, via sharing an electronic questionnaire using Google Forms (docs. google.com/forms). The online questionnaire link was sent to different groups on WhatsApp, Messenger, and other social media platforms (Facebook, Inc., California, USA). The respondents aged 18-year-old and above who understood the poster's content confirmed their willingness for voluntary participation and completed the self-report questionnaire. The link remained active for two weeks, during which 348 participants in total recorded their responses. However, after checking the completion of the questionnaires, it was found that 15% of the questionnaires filled by the male participants had missing items, and subsequently, were excluded from the analysis. Sampling was web-based and from available samples. The relevant link was placed on social networks for anyone who wished to complete it. However, because the study population was women, all men were excluded from the study. The sample size was equal to the number of items multiplied by 10 (22). After the omission of 31 items through psychometric evaluation, the sample size involved only 310 subjects.

Development of the instrument

This study's survey instrument was developed by employing the KAP survey framework to guide, and translated to Persian language (natively spoken) (19,23).

The pre-tested questionnaire comprised four sections including the respondents' socio-demographic characteristics, KAP. Overall, 38 items were included for KAP sections based on the literature and expert opinions. The responses related to the Knowledge component are categorized into three modes of "true", "false", and "do not know." The correct, incorrect, and unaware responses were denoted as (+1), (−1), and (0), respectively. The higher points remarked the more knowledgeable use of sanitizers. The scores were calculated individually, and a cumulative value was obtained for all. The positive, neutral, and negative attitudes of respondents were defined through 5 options of "definitely agree", "moderately agree", "no idea", "definitely disagree", and "moderately disagree," which were signified by (-2), (-1), (0), (2), and (1) scores, respectively. Then, the values summed up, and the final attitude score achieved. The responses related to Practice component were provided in 5 modes of 'Never,' 'Rarely,' 'Sometimes,' 'Frequently,' and 'Always,' which were scored as (0), (1), (2), (3), and (4), respectively. For the negatively quoted questions, a reverse scoring was done.

The scores of Knowledge and Practice were evaluated as poor or good, while the responses of Attitude were

considered as 'negative' or 'positive.' It should be noted that the poor score or negative attitude refers to the total score equal to or below the median; however, the good score or positive attitude suggests the total score above the median value. The scoring method of items is presented in the KAP-31 questionnaire, which is attached as supplementary materials.

Validation of the questionnaire
For validation of the questionnaire, face validity, content validity, and construct validity were performed (24-30).

Face validity
Quantitative and qualitative methods were used to evaluate face validity. In the qualitative phase, 20 women with different age and educational levels were asked to evaluate the questionnaire and indicate if they felt ambiguity or difficulty in responding to the questions. Eventually, the items were edited according to the recommendations of this group. Meanwhile, two experts in the field of Persian literature and 10 experts in the domains of KAP and instrument development were asked to interpret on wording and grammar of items (24). In the quantitative phase, the impact score (frequency × importance) was calculated for the impact of items. In this step, another 10 women were asked to evaluate the items in terms of importance on a scale of 1 to 5. Items were considered appropriate if they had an impact score equal or greater than 1.5, corresponding to a mean frequency of 50% and a mean importance of 3 on the 5-point Likert scale (25).

Content validity
The content validity of KAP was surveyed both quantitatively and qualitatively by 8 experts' comments in the field of environmental health (3 person), health education and promotion (3 person), and methodology (2 persons). Clarity, relevancy, simplicity, and consistency of items were specified applying 4-point Likert scale. An open question was also asked to elicit the opinions of the experts concerning each item. The scores of content validity index (CVI) were computed on the basis of the simplicity, clarification, and relevancy of each item. According to Lynn's criteria, if the number of experts is between 6 and 10, I-CVI equal to or higher than 0.78 is considered to be excellent (31). Items with an I-CVI ranging from 0.7 to 0.78 were revised and items with an I-CVI lower than 0.70 were eliminated (32). Content validity ration (CVR) scores were calculated based on the necessity of each item. For eight experts, a minimum value of 0.62 was considered as an acceptable level of significance (25).

Construct validity
The construct validity of KAP was conducted using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA was performed to determine the underlying factors of each questionnaire (26). Before performing EFA, all items were examined in terms of the accuracy of data entry, missing values, normality, and outliers. Kaiser-Meyer-Olkin (KMO) measure of the sampling adequacy (KMO) and Bartlett's test of the sphericity was used for sampling adequacy. A KMO value greater than 0.7 and the significance of the Bartlett's test ($P < 0.05$) are the indicative of adequate number of samples (33). Principal axis factoring method with Oblimin rotation for the component extraction was applied and the factor loading or greater than 0.4 was considered acceptable (34). CFA with the maximum likelihood estimation method was carried out to test whether the data fit the hypothesized measurement model extracted by EFA. Goodness-of-fit indices and reasonable cut-off values of these indices for CFA were considered as $\chi^2/df < 3$, root mean square error of approximation (RMSEA) < 0.08, as well as comparative fit index (CFI), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), and incremental fit index (IFI) > 0.9 (35).

Assessment of reliability
Cronbach's alpha internal consistency was calculated for the total questionnaire and its dimensions to determine the reliability. Cronbach's alpha >0.7 was considered a satisfactory internal consistency (36).

Data management and additional analyses
Fully completed questionnaires were extracted from Google Forms and introduced to Microsoft Excel 2016 for cleaning and coding. The cleaned data were introduced to the IBM SPSS Statistics and IBM SPSS Amos (version 24.0. Armonk, NY: IBM Corp; 2016) for analyses. Numerical data were summarized as means and standard deviations or median and range as appropriate. Categorical data were summarized as frequencies and proportions. A *P* value less than 0.05 was considered statistically significant.

Results
Participants
A total of 330 women completed the questionnaire (7 questionnaires that belonged to male respondents were eliminated). Participants' mean age was 36.78 ± 10.12 years, 74.2% were married, and 46.7% had a bachelor's degree. Other characteristics of the participants are presented in Table 1.

Face validity
In the qualitative face validity, participants stated that they had no difficulty in understanding the items. The impact score was calculated to examine quantitative face validity. Impact scores of the items for KAP varied from 1.88 to 4.38, 3.75 to 4.75, and 4.38 to 4.88, respectively. Thus, all the items were kept for the next steps of psychometric assessment.

Table 1. Frequency distribution of demographic characteristics, taking care of the sick person or being sick, and type of sanitizer used of the study population (n = 330)

Variable	Level	Frequency	%
Age (year)	< 30	79	23.9
	30-40	147	44.5
	≥ 40	104	31.5
Marital status	Single	85	25.8
	Married	245	74.2
Education level	≤ Diploma	74	22.4
	Bachelor's degree	132	40.0
	Master's degree	81	24.5
	PhD	43	13.0
Occupation	Unemployed	154	46.7
	Working in the healthcare sector	54	16.4
	Working in the other sectors	102	30.9
	Retired	20	6.1
Take care of the sick person or being sick	Yes	6	1.8
	No	324	98.2
Use of alcohol sanitizer	Yes	231	70.0
	No	99	30.0
Use of sodium hypochlorite	Yes	169	51.1
	No	161	48.8
Use of calcium hypochlorite	Yes	13	3.9
	No	317	96.1
Use of disinfection gel	Yes	135	40.9
	No	195	59.1
Use of sanitizer purchased from a pharmacy	Yes	172	52.1
	No	158	47.9
Having respiratory distress	Yes	82	24.8
	No	248	75.2

Content validity

In the quantitative content validity, items with CVR and CVI less than 0.62 and 0.75, respectively, were omitted. Consequently, three items of Knowledge, three items of Attitude, and 1 item of Practice were eliminated in this validity step. Simultaneously, the items were edited in terms of grammar, wording, and allocation based on the experts' opinions in the qualitative phase. Table 2 summarizes the CVR and CVI results by each final item.

Construct validity and reliability

All items were normally distributed so that the skewness and kurtosis statistics indicated that all values were within the range of ± 2. The standard scores (z-score) for every item were in the range of ± 4, indicating no extreme cases or outliers in the data. Hence, the data were suitable for further analysis, as no significant violation was found. The KMO index and Bartlett's test for each subunit showed that the data were proper for factor analysis (Knowledge: KMO = 0.713, χ^2 = 547.272, P < 0.001; Attitude: KMO =

0.812, χ^2 = 835.633, P < 0.001; Practice: KMO = 0.768, χ^2 = 697.272, P < 0.001). For each subunit, principal component analysis (PCA) with oblimin rotation identified three factors with eigenvalues > 1.5 and factor loading ≥ 0.4. Percentages of variance explained by three factors of KAP were 60.3, 62.3, and 68.2, respectively, accounting for 54.2% of the variance. Table 2 represents the included items in the factor analysis and their associated factor loadings. Initially, the EFA was conducted on a random sample of 50% of subjects (cases as "exploring" data), and subsequently, CFA was used on the remaining sample (cases as "testing" data). As shown in Table 3, the second hypothesized CFA model had acceptable goodness-of-fit indices. The conceptual framework of the CFA model with three constructs is shown in Figure 1. Standardized factor loadings are displayed in the above-mentioned pathways. All relationships between factors and items, as well as between the factors, were significant (P < 0.05).
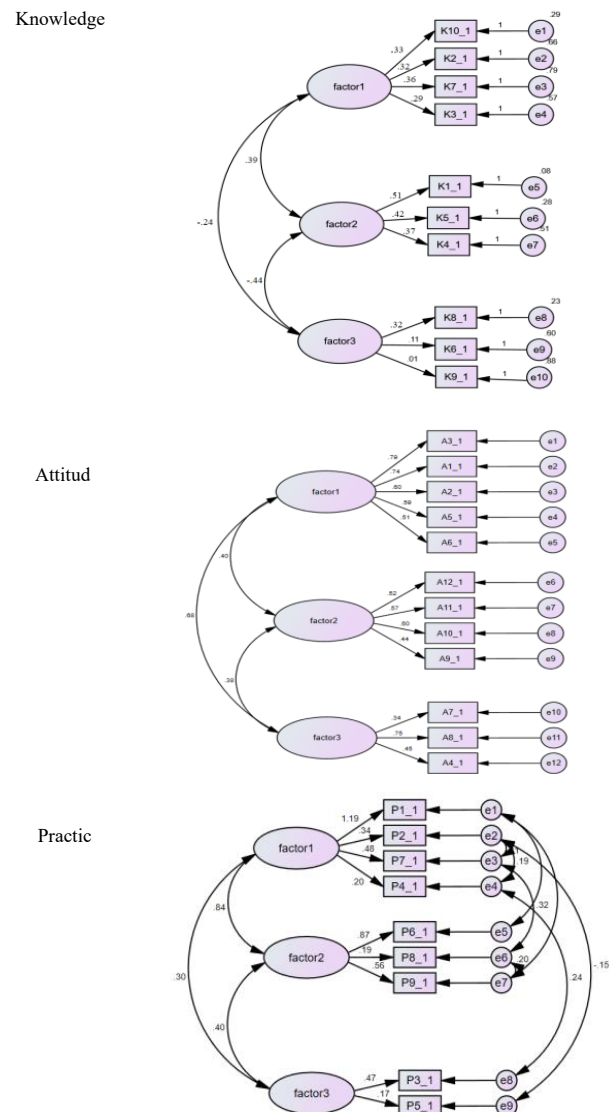

Figure 1. Relationships between items and factors and between factors (from confirmatory factor analysis). All relationships between factors and items as well as between the factors were significant (P < 0.05).

Table 2. Factor loading results after rotating, CVI, CVR, and Cronbach's alpha of the questionnaire

KAP subunits	Domain	Item	Loading	CVI	CVR	Alpha
Knowledge [a]	Factor 1	10	0.693	0.96	0.75	0.7301
		2	0.472	1.00	1.00	
		7	0.443	0.96	0.75	
		3	-0.416	0.92	0.75	
	Factor 2	1	0.602	0.92	1.00	0.707
		5	0.574	1.00	0.75	
		4	0.550	0.92	0.75	
	Factor 3	8	0.709	0.96	0.75	0.821
		6	0.599	0.88	0.75	
		9	-0.524	0.96	0.75	
Attitude [b]	Factor 1	3	0.865	0.88	0.75	0.828
		1	0.831	0.92	0.75	
		2	0.712	0.92	0.75	
		6	0.540	0.92	0.75	
		5	0.529	0.92	1.00	
	Factor 2	12	0.780	0.96	1.00	0.791
		10	0.720	1.00	1.00	
		11	0.635	0.96	1.00	
		9	-0.518	0.92	1.00	
	Factor 3	7	0.802	0.92	0.75	0.751
		8	-0.542	1.00	1.00	
		4	-0.411	0.92	1.00	
Practice [c]	Factor 1	1	0.816	0.92	1.00	0.869
		2	0.745	0.92	1.00	
		3	0.663	0.92	1.00	
		4	0.621	0.88	1.00	
	Factor 2	9	-0.861	0.92	1.00	0.787
		6	-0.774	0.83	1.00	
		8	-0.573	0.92	1.00	
	Factor 3	5	0.768	0.79	1.00	0.816
		3	0.626	0.79	0.75	

[a] 60.7% of total variance explained by three components. Cronbach's alpha = 0.753.
[b] 62.3% of total variance explained by three components. Cronbach's alpha = 0.790.
[c] 68.2% of total variance explained by three components. Cronbach's alpha = 0.806.

Cronbach's alpha was obtained as 0.753, 0.790, and 0.806 for KAP, respectively, suggesting the acceptable internal consistency.

Distribution of KAP

Figure 2 shows the responses of the respondents (%) about KAP. More than 50% of participants chose the "true" mode for Knowledge items, except for item K7. The maximum percentage of "false" and "do not know" mode belonged to K9 and K3, respectively. However, "false" and "do not know" had a minimum percentage of selection for K1. Out of 5 modes of responses in the Attitude section, "moderately disagree" and "definitely agree" had the most and the least frequency percentage, respectively. Among the other items of Attitude, A2 had the most symmetrical distribution of responses. The highest frequency of "definitely disagree", "moderately disagree", "no idea", "moderately agree", and "definitely agree" options belonged to A11, A12, A2, A8, and A3 items, respectively. On the other hand, the lowest frequency of "Definitely disagree", "Moderately disagree", "no idea", "moderately agree", and "definitely agree" were recorded for A3, A9, A11, A12, and A12, respectively. In the Practice section, less than 40% of respondents chose "never" option. Whereas "always", "frequently," and "sometimes" contributed more than 80% of responses. In comparison with the other items, P6 had the lowest frequency of "never", "rarely", and "sometimes". However, the minimum frequency of "frequently" and
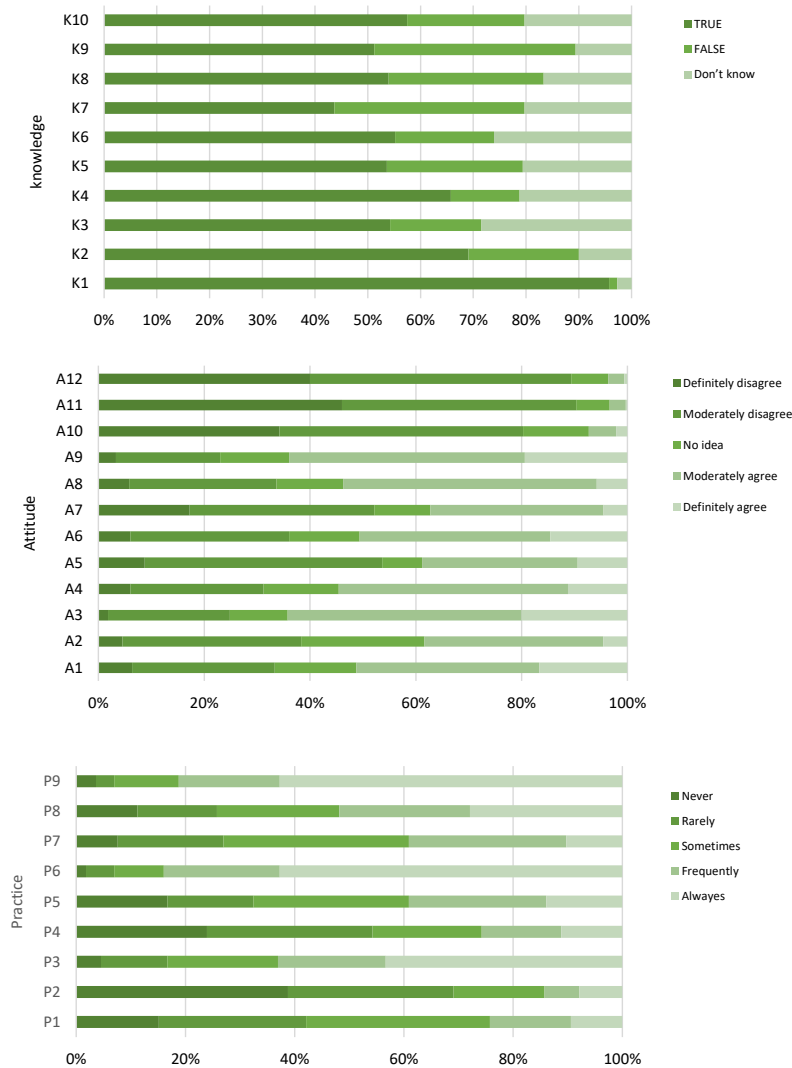
Figure 2. Responses of the respondents (%) about knowledge, attitude, and practice.

"always" belonged to P2. The maximum frequency of "never", "rarely", "sometimes", "frequently", and "always" were observed in P2, (P2 and P4), P7, P7, (P6 and P9) items, respectively (Figure 2). Table 4 provides the mean ± SD subscale scores and the number of items in each subscale. Among the other subscales, Knowledge had the highest frequency of good score. The positive attitude score was 17% higher than the negative attitude.

KAP and covariates

The statistical relationships between respondents and KAP's demographic variables are given in Table 5; the age and marital status did not provide a significant relationship against KAP ($P > 0.05$). Education level on each subunit of KAP (knowledge: $P = 0.043$, attitude: $P = 0.013$, and practice: $P = 0.036$) and occupation only on attitude were significant factors ($P = 0.019$).

Discussion

The present study was conducted during the mid-phase of the COVID-19 outbreak in the affected area. To the best of our knowledge, this is the first-ever study conducted by developing a questionnaire for assessing the KAP of the women regarding the use of sanitizers at home to control the Coronavirus disease. In this study, seven questionnaires (2.0%) had selected the male gender, and 11 questionnaires (3.2%) had more than 15% missing items, and then, were excluded from the analysis. This low percentage of missing values showed the acceptable feasibility of the questionnaire. In the qualitative face validity, participants reported that they had no difficulty in understanding the items.

On the other hand, all impact scores of items in the quantitative phase of face validity were appropriate scores. In qualitative and quantitative content validity, a satisfactory level of agreement was found among experts, suggesting that the final scale had good content validity.

Table 3. Factor loading results after rotating, CVI, CVR, and Cronbach's alpha of the questionnaire

KAP Subunits	χ²/Df	GFI	AGFI	IFI	NFI	CFI	RMSEA
Knowledge	1.87	0.965	0.932	0.963	0.934	0.951	0.054
Attitude	2.221	0.954	0.915	0.923	0.901	0.921	0.060
Practice	2.043	0.974	0.941	0.965	0.945	0.963	0.487

χ2: Chi-square value; Df: Degrees of freedom; RMSEA: Root mean square error of approximation; GFI: Goodness-of-fit index; AGFI: Adjusted Goodness-of-fit index; IFI: Incremental fit index; NFI: Normed fit index; CFI: Comparative fit index.

Table 4. Distribution of the knowledge, attitude, and practice scores

Category	Subcategory	Frequency (%)	Mean±SD
Knowledge score	-10 to 0 (poor)	43 (13)	3.79±2.79
	1 to 10 (good)	287 (87.0)	
Attitude score	-24 to 0 (negative)	137 (41.5)	1.69±0.38
	1 to 24 (positive)	193 (58.5)	
Practice score	9 to 18 (poor)	112 (33.9)	20.67±5.53
	19 to 36 (good)	218 (66.1)	

The current EFA suggested a three-factor structure as an optimized structure for each subunit of KAP. These three-factor structures confirmed by CFA, indicate the acceptable fit of the proposed models.Internal consistency of different constructs showed that Cronbach's alpha generally exceeded the standard of >0.70, confirming the satisfactory reliability of KAP-31. The analysis of women's knowledge and the factors affecting their attitudes and practices could provide a useful reference for the correct use of sanitizers against COVID-19. Most of the participants in the study believe that television is the best educational resource for sanitizers. Similar findings were also supported by Narayana et al in India and Zhang et al in China, where television and social media were ranked as the top information resources for COVID-19 (37,38).

It was found that the majority of the participants (87%) had good knowledge. The high rate of knowledge about COVID-19 among respondents is probably due to the public exposure to the information provided by the government of Iran and media, especially television and Instagram, telegram and etc. The second reason could be that 78.3% of the respondents were graduate or above graduation levels of education. A positive correlation was found between higher education levels and high knowledge scores ($P = 0.043$), which is consistent with the results of a study by Narayana et al (37). The correlation of higher education levels with better knowledge scores is well known (39, 40). In the present study, the knowledge rate is a little low compared to that reported in Iran and China, where the correct overall rate of knowledge about COVID-19 is 90%. Based on the findings of this study, there is no significant correlation between age, marital status, and occupational status with knowledge. On the contrary, Pal et al found that the married participants had higher total knowledge scores than unmarried ones (41). It has been shown that married people have higher knowledge scores compared to unmarried counterparts (39). Also, Narayana et al found that knowledge scores towards COVID-19 were high among the population aged more than 40 years and had higher education levels (37).

Regarding attitudes of the participants towards being infected by COVID-19 and disinfection against COVID-19, only 58.5% of them were positive. In other words, 51% of participants were always afraid of being

Table 5. Frequency distribution of demographic of study population

Variable	Level	Knowledge Frequency (%) Poor	Knowledge Frequency (%) Good	Knowledge P value*	Attitude Frequency (%) Negative	Attitude Frequency (%) Positive	Attitude P value*	Practice Frequency (%) Poor	Practice Frequency (%) Good	Practice P value*
Age (year)	<30	13 (30.2)	66 (23.0)		36 (26.3)	43 (22.3)		24 (21.4)	55 (25.2)	
	30-40	21 (48.8)	126 (43.9)	0.249	66 (48.2)	81 (42.0)	0.144	51 (45.5)	96 (44.0)	0.738
	≥40	9 (20.9)	95 (33.1)		35 (25.5)	69 (35.8)		37 (33.0)	67 (30.7)	
Marital status	Single	14 (32.6)	71 (24.7)		30 (21.9)	55 (28.5)		30 (26.8)	55 (25.2)	
	Married	29 (67.4)	216 (75.3)	0.274	107 (78.1)	138 (71.5)	0.177	82 (73.2)	163 (74.8)	0.760
Education level	≤Diploma	12 (27.9)	62 (21.6)		42 (30.7)	32 (16.6)		22 (19.6)	52 (23.9)	
	Bachelor's degree	10 (23.3)	122 (42.5)	0.043	44 (32.1)	88 (45.6)	0.013	36 (32.1)	96 (44.0)	0.036
	Master's degree	16 (37.2)	65 (22.6)		33 (24.1)	48 (24.9)		34 (30.4)	47 (21.6)	
	PhD	5 (11.6)	38 (13.2)		18 (13.1)	25 (13.0)		20 (17.9)	23 (10.6)	
Occupation	Unemployed	25 (58.1)	129 (44.9)		78 (56.9)	76 (39.4)		48 (42.9)	106 (48.6)	
	Healthcare sector	5 (11.6)	49 (17.1)	0.166	18 (13.1)	36 (18.7)	0.019	19 (17.0)	35 (16.1)	0.412
	Other sectors	13 (30.2)	89 (31.0)		34 (24.8)	68 (35.2)		35 (31.3)	67 (30.7)	
	Retired	-	20 (7.0)		7 (5.1)	13 (6.7)		10 (8.9)	10 (4.6)	

infected, and 64% of them were so worried about being infected by COVID-19 when they were outdoors. Despite having good knowledge, participants are extremely worried and anxious if they get infected by COVID-19. In this regard, the role of information published in cyberspace can probably be important because 50% of participants believe that the propagation of information about COVID-19 in social media raises their concern. It should be noted that 'being worried' or 'anxious about COVID-19' implies that participants are well aware of the disease, which will make them more cautious to avoid exposure. Low health literacy makes them more likely to be less worried and less prepared for the outbreak of COVID-19. However, the government must plan some measures to reduce public anxiety because it can negatively affect the psychological well-being of individuals. Controlling the misinformation published in cyberspace and social media can be considered as one of the appropriate ways in this regard. Participants in the present study believed in sanitizers' effectiveness against COVID-19 despite some probable respiratory effects and preferred to use them against COVID-19. Of course, 50% of them agreed that the high consumption of sanitizers increases their confidence. However, due to the overconsumption of sanitizer, this issue needs more attention because of the possible health effects. For vegetable disinfection, 64% of participants agreed with more training on the required dose of disinfection. An increase in water consumption and wastewater generation can be considered as an environmental aspect of COVID-19. The observation during the COVID-19 pandemic shows that due to health concerns, the consumption of water in homes for health purposes increased sharply in the study area. Even there was a shortage of water in some cities. Of course, in the present study, 90% of participants do not agree with this issue. In this study, a significant correlation was observed between attitude and education level and occupation. The most negative attitude was among non-employees. However, the correlation of attitude with age and marital status was not significant. A study by Zhang et al showed that the attitudes and practices concerning COVID-19 among healthcare workers are influenced by risk factors such as work experience and job category (38).

Regarding practice, only 66.1% of participants had acceptable practices, and the rest had poor practices. Twenty-four percent of participants stated that they frequently or always disinfected all house surfaces more than once a day, and 14% stated that they disinfect shoe soles every day. Moreover, regarding frequent disinfection of the handles, 29% of participants stated "frequently" and 10% stated "always" doing this action. Likewise, 74% of respondents monitored the hand washing of family members occasionally or regularly. These findings may indicate a type of "health obsession", which can lead to various health effects, e.g., on the respiratory system

(14,15), or skin and psychological disorders. Moreover, 43% of participants stated that their skin over hands is "always" dry due to the application of sanitizers, and 19.6% of participants had experienced a similar outcome "frequently". Finally, 20% had this experience "sometimes". According to these results, it appears that more than 80% of participants had experienced dry skin because of the use of sanitizers. This can happen due to improper use of sanitizers or the use of wrong and unsuitable sanitizers. Considering the type of sanitizer, only 11% of participants preferred bleach rather than alcohol. Bleach refers to a dilute solution of sodium hypochlorite with broad-spectrum bactericidal and antivirus properties, making it useful for disinfecting and sterilizing. Although bleach is cheaper than alcohol, however, it has an irritant odor. At high concentrations, it can damage the respiratory system. It also causes damage to objects due to oxidizing properties. Chlorine, as a powerful oxidizer, is the active agent in many household bleaches. Recent research has shown that washing hands with soap or handwashing liquid and water for 20 seconds can kill the coronavirus (42).

Consequently, soap or handwashing liquid can be an alternative to a variety of sanitizers. In the present study, 16.6% of participants declared that they never use soap or handwashing liquid instead of sanitizers. For 15.7% of participants, the response was "rarely", and for 28.4%, the response was "sometimes". Therefore, it seems that women need to be educated about the proper use of sanitizers and disinfection methods at homes.

Mobile phones are highly contaminated with the COVID-19 due to contact with the hand and different surfaces. They can be considered as a potential vector for COVID-19 spread, especially in health care centers and hospitals (43). Therefore, their disinfection is highly recommended to prevent COVID-19 disease. The results of the present study reveal that 62.7% of participants "always" and 18.4% "frequently" disinfect cell phone and keychain with an alcohol-soaked cloth when they enter the house.

This study has some limitations. The number of participants in the study was not high, so the results of this study may not be generalizable. Additionally, the measurement of KAP among women regarding the use of sanitizers at home may be inaccurate due to the limited number of items. Therefore, there is a need for a detailed study to resolve these issues by addressing these shortfalls. Another limitation is the interpretation of the results as COVID-19 is a novel virus, and there is a limited number of studies that can be compared at this point.

Conclusion

According to the results of this study, although a high percentage of participants had good knowledge about COVID-19, they did not still get a high score in terms of

attitude and performance. It appears that there are still many problems related to the use of various sanitizers and disinfection methods, and some people have troubles with this issue. Given the participants' involvement with skin problems, etc., it seems that providing additional training to overcome the anxieties of housewives about the prevention of COVID-19 is necessary. Controlling unscientific information published in cyberspace and social media can also be a useful measure.

Acknowledgments

Ethics issues

The study protocol and procedures of informed consent before the formal survey were approved by the Ethics Committee of Tabriz University of Medical Sciences (Ethical code: IR.TBZMED.REC.1399.373). The ethical considerations were explaining the study purpose to the participants, reassuring the participants about the confidentiality of all recorded data, keeping the anonymity of data, and participants' right to withdraw at any time during the research process. The respondents who aged 18-year-old and above and understood the poster's content confirmed their willingness for voluntary participation and completed the self-report questionnaire.

Competing interests

The authors declare that there is no conflict of interests.

Authors' contributions

MM and NG conceived and designed the study. SD supervised the data collection. NG, MN, SD, and RA analyzed and interpreted the results and contributed to writing the initial draft of the manuscript. RA and VK revised the text, and VK edited the final version. All authors approved the final version of the manuscript and gave their consent for publication.

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