



Factors associated with Turkish pharmacists' intention to receive COVID-19 vaccine: an observational study

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Abstract

Background Pharmacists have been taking part in vaccination services during the COVID-19 pandemic. However, research identifying pharmacists' intention to get COVID-19 vaccine is limited. **Aim** The objective of this study was to determine the intention to receive COVID-19 vaccine and to identify the factors related to it based on the Health Belief Model framework among Turkish pharmacists. **Method** This is an observational study conducted between December 2020 and January 2021. The online survey was sent to all hospital and community pharmacists working in Turkey. Transtheoretical Model of Behaviour Change and Health Belief Model were used for the development of the questionnaire. Univariate and multivariate logistic regression analyses were conducted to identify factors associated with the intention to receive COVID-19 vaccine. **Results** Among all participants (n=961), 74.7% had an intention to receive the COVID-19 vaccine. In model 1, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers were associated with their intention to receive the COVID-19 vaccine ($p < 0.05$). In model 2, the intention to receive COVID-19 vaccine was associated with being male, years of experience in the professional field, not having contracted COVID-19, having a pharmacy staff who had contracted COVID-19, and having had received seasonal flu shot within the previous year ($p < 0.05$). **Conclusion** This study highlights the factors related to the intention of the pharmacists to receive COVID-19 vaccines. Health Belief Model is the strongest predictor for vaccination intention and could be used to develop behavioural change techniques to promote vaccination.

Keywords COVID-19 · Health belief model · Intention · Pharmacists · Vaccine hesitancy · Vaccination

Impact on Practice

- Lower rate of vaccine hesitancy among pharmacists was determined during the second wave of the COVID-19 pandemic in Turkey (before the initiation of the vaccination program in Turkey).

- Behavioural change interventions based on health belief model could be developed to promote COVID-19 vaccination among pharmacists.

Introduction

World Health Organization reported that by 2021 there had been more than 167 million COVID-19 cases and 3 million deaths globally [1]. While there is still no effective treatment for COVID-19, prevention is possible through practicing personal protection measures and vaccination. In Turkey, COVID-19 vaccination had started on January 14th, 2021 for healthcare workers including pharmacists. As of April 2021, more than 12 million people have been vaccinated with two doses in Turkey [2]. While the vaccination efforts are continuing, studies are also continuing to evaluate healthcare workers' intention to receive COVID-19 vaccine during COVID-19 pandemic. It was reported that healthcare workers had low intention to receive COVID-19 vaccine

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when compared with the non-healthcare workers during the COVID-19 pandemic [3, 4]. Unlike previous studies [3, 4], Detoc et al. [5] determined that healthcare workers were more willing to receive COVID-19 vaccine when compared with non-healthcare workers (81.5% vs 73.7%, respectively). Health Belief Model (HBM) has been commonly used to explore individuals' intention to receive COVID-19 vaccine since the beginning of the pandemic [3, 6–8].

Demographic characteristics (age, gender, educational level, professional experience), knowledge and attitudes towards vaccination, HBM constructs (risk perception for infection development, perceived benefits of vaccination, and cues to action), past practice towards vaccination, and influenza vaccination history were identified as the main factors associated with vaccination intention and practice [9, 10]. Schmid et al. [9] identified complacency (low worry and perceived risk of the disease) and lack of confidence (low perceived vaccine safety and mistrust of the authorities) as the most common barriers for vaccination hesitancy. The main concerns of health care workers about the H1N1 influenza vaccine were related to the side effects, efficacy of the vaccine, and developmental processes (including the phase studies) [11–15].

Collange et al. [16] indicated the importance of exploring the determinants of general practitioners' and family physicians' vaccination intention and practices since these factors might influence their counselling practices. As primary care providers, pharmacists also take part in vaccination services by providing counselling and administration of vaccines [17, 18]. Yet studies evaluating vaccination intention of pharmacists (especially community pharmacists) are limited.

Aim

This study aimed to determine the intention to receive COVID-19 vaccine by using Transtheoretical Model of Behavior Change and to identify the factors related to it based on the HBM framework among pharmacists. The second objective was to develop a reliable scale based on HBM for identifying the intention to receive the COVID-19 vaccine. This study was conducted before the phase III clinical trials were finalized [19] and before the COVID-19 vaccination program had started in Turkey.

Ethics approval

The study protocol was approved by the Non-Interventional Clinical Research Ethics Committee of Bezmialem University (December 22nd, 2020–21/408). Electronic informed consent was obtained, and the participants anonymously filled in the online questionnaire. Approval was

obtained from the Ministry of Health of the Republic of Turkey prior to the start of the study.

Method

Study Setting and subjects

This is an observational study carried out between December 27th, 2020 and January 13rd, 2021. The study population was hospital and community pharmacists working in Turkey. The invitation and the link of the survey were sent to the members of the Pharmacy Chambers (n = 26 769). Turkish community pharmacists are obliged to register to the Pharmacy Chambers, but there is no such requirement for hospital pharmacists. To increase the participation of the hospital pharmacists, participants were encouraged to forward the survey link to their colleagues. The link of the survey was shared also through social network platforms (eg. WhatsApp Messenger[®], Facebook). Marmara University Questionnaire System powered by LimeSurvey[®] was used to generate the online survey link. The system permitted completing the questionnaire only once for each participant.

Measures

Demographic data included age, gender, professional field, and professional experience. Participants were asked whether they were living with elder family members (≥ 60 years old) and/or with other health care workers in the same household. We also evaluated the presence of chronic diseases, personal and family history (morbidity & mortality) related to COVID-19 since these factors might influence the intention to get vaccinated. Use of dietary and vitamin and mineral supplements and getting the flu shot within the previous season were also assessed.

Transtheoretical Model of Behavior Change was used to determine the intention to receive the COVID-19 vaccine [20, 21]. Participants were asked to select one option among the following: “*Yes, I am planning to receive COVID-19 vaccine in the next 30 days*”, “*Yes, I am planning to receive COVID-19 vaccine in the next 6 months*”, “*Yes, I am planning to receive COVID-19 vaccine; but I do not know when*”, “*No*” and “*Maybe*”. All the “yes” responses were evaluated as a positive intention to receive the COVID-19 vaccine.

In the light of the literature [22–26], a scale based on the constructs of the HBM [27] was developed to identify the intention to receive the COVID-19 vaccine. The constructs of the HBM were perceived severity (n = 4 items), perceived susceptibility (n = 2 items), perceived

benefit (10 items), perceived barriers (6 items), and cues to action (2 items). A 5-point Likert scale (1 strongly disagree to 5 strongly agree) was used to assess each item [28]. The items evaluating perceived barriers were reversed when calculating the total score. An expert panel ($n = 7$) reviewed the content of the scale. A pilot study on pharmacists ($n = 20$) was conducted to ensure the items were interpreted correctly. The mean duration to complete the scale was 5–10 min.

Data analysis

Descriptive statistics were presented by means (standard deviation) and medians (interquartile range) for continuous variables and frequencies (percentages) for categorical variables. Normality of the data were evaluated by the Kolmogorov–Smirnov test. Mann Whitney U test was used to compare continuous variables for two independent groups since the data didn't follow a normal distribution. The 2-week test–retest reliability of the scale ($n = 30$) was evaluated by Spearman's correlation and the Wilcoxon test. The Cronbach's alpha was calculated for the total scale and each construct of HBM. Factor analysis was used with varimax rotation. Kaiser–Meyer–Olkin Measure of Sampling Adequacy and the Bartlett's Test of Sphericity were evaluated. Univariate and multivariate logistic regression analysis was conducted to identify factors associated with the intention to receive COVID-19 vaccine based on the Transtheoretical Model of Behavior Change. Variables with a $p < 0.10$ were included in logistic regression (enter method) analysis. Two logistic regression models were constructed. In the first model, demographic variables (gender, duration of professional experience as a pharmacist) and HBM constructs were included as predictor variables. In the second regression model, demographic variables (gender, duration of professional experience as a pharmacist), their experience, and risk factors related to COVID-19 (having had contracted COVID-19, having a pharmacy staff who had contracted COVID-19, having a chronic disease associated with COVID-19 risk), and past practice towards vaccination (had received seasonal flu vaccine within the previous season [Autumn–Winter 2019]) were included as predictors. $p < 0.05$ was considered as the level of statistical significance.

Results

The link was accessed by 2631 pharmacists and 961 completed the questionnaire. Characteristics, experience, and risk factors related to COVID-19 and vaccination practices and intentions ($n = 961$) of the participants are presented in

Table 1. The mean age of the pharmacists was 41.3 (11.7) years. Most of the pharmacists (67.5%) were female.

Of the participants, 14.8% had at least one chronic disease as a risk factor for COVID-19. Among all, 85.3% hadn't contracted COVID-19, 10.7% had developed symptomatic COVID-19 and 1.1% had been hospitalized due to COVID-19. Only 23.3% had been at least once in quarantine due to COVID-19 suspicion. Most of the participants (84.1%) had used at least one dietary supplement/ vitamin and mineral to prevent COVID-19. The intention to receive the COVID-19 vaccine was 74.7% based on the Transtheoretical Model of Behavior Change. Of the participants, 17.0% had received seasonal flu vaccine within the previous year.

Spearman's correlation coefficient was 0.835 between the two-week test–retest scores ($p < 0.01$). There was no statistically significant difference between the test and retest scores ($p > 0.05$). The Cronbach's alpha for the HBM scale was 0.879. The Cronbach's alpha for perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action were 0.645, 0.757, 0.911, 0.884, and 0.845, respectively. Kaiser–Meyer–Olkin Measure of Sampling Adequacy yielded a value of 0.911 and the Bartlett's Test of Sphericity was significant ($p < 0.001$). Factor analysis determined five subscales which explained 64.6% of the total variance.

The participants who had an intention to receive COVID-19 vaccine had higher scores for perceived susceptibility, severity, and benefits and lower scores for barriers compared to the ones with no intention/indecisive ($p < 0.001$). There was no significant difference in perceived cues to action based on their intention to receive the COVID-19 vaccine ($p > 0.05$) (data not shown).

Univariate analysis exploring the factors associated with the intention to receive COVID-19 vaccine are presented in Table 2. Older age (OR = 1.03, 95% CI: 1.01–1.04; $p < 0.001$), being male (OR = 1.70, 95% CI: 1.22–2.36; $p < 0.01$), and increased professional experience as a pharmacist (OR = 1.03, 95% CI: 1.01–1.04; $p < 0.001$) were associated with the intention to receive COVID-19 vaccine. Multiple logistic regression analysis for intention to receive COVID-19 vaccine are presented in Table 3.

Increased scores of the four constructs (susceptibility, severity, benefits and barriers) of the scale were significantly associated with the intention to receive the vaccine in Model 1. Perceived susceptibility (OR = 1.35; 95% CI: 1.07–1.70; $p < 0.05$), perceived severity (OR = 1.98; 95% CI: 1.42–2.77; $p < 0.001$), perceived benefits (OR = 5.98; 95% CI: 4.05–8.84; $p < 0.001$), and perceived barriers (OR = 4.11; 95% CI: 2.92–5.78; $p < 0.001$) were associated with their intention to receive the COVID-19 vaccine in the pharmacists. Cues to action (OR = 1.29; 95% CI: 0.99–1.68) and demographic variables were not significantly associated with the intention to vaccination ($p > 0.05$).

Table 1 Demographic characteristics, experience and risk factors related to COVID-19, vaccination practice, and intentions of the participants (n = 961)

	n	%
Gender		
Male	312	32.5
Female	649	67.5
Professional field		
Community Pharmacist	768	79.9
Hospital Pharmacist	193	20.1
Professional experience as a pharmacist (years)		
≤ 5	240	25.0
6–10	132	13.7
11–15	106	11.0
16–20	147	15.3
> 20	336	35.0
Living with elder family members at the same household		
Yes	183	19.0
No	778	81.0
Living with other healthcare workers at the same household		
Yes	346	36.0
No	615	64.0
Having a chronic disease associated with COVID-19 risk		
Yes	142	14.8
No	819	85.2
Having had contracted COVID-19		
Yes. asymptomatic	27	2.81
Yes. symptomatic	103	10.72
Yes. hospitalized	11	1.14
No	820	85.33
Having relatives who had contracted COVID-19		
Yes	475	49.4
No	486	50.6
Having a pharmacy staff who had contracted COVID-19		
Yes	361	37.6
No	600	62.4
Having close friends/relatives/colleagues who had died due to COVID-19		
Yes	410	42.7
No	551	57.3
Having close friends/relatives/colleagues who had been hospitalized in the intensive care unit due to COVID-19		
Yes	485	50.5
No	476	49.5
Having been in quarantine due to COVID-19 suspicion		
None	737	76.7
At least once	224	23.3
Having used dietary supplements/vitamins/ minerals to prevent COVID-19		
Yes	808	84.1
No	153	15.9
Having had received seasonal flu vaccine within the previous season (Autumn–Winter 2019)		
Yes	163	17.0
No	798	83.0
Intention to receive COVID-19 vaccine		
Yes*	718	74.7
Maybe	129	13.4

Table 1 (continued)

	n	%
No	114	11.9

*All positive responses were presented as “yes” based on the Transtheoretical model of behavior change

In Model 2, the intention to receive COVID-19 vaccine was associated with being male (OR = 1.59; 95% CI: 1.13–2.23; $p < 0.01$), years of experience in the professional field (OR = 1.02; 95% CI: 1.01–1.04; $p < 0.01$), not having contracted COVID-19 (OR = 1.70, 95% CI 1.14–2.54; $p < 0.01$), having a pharmacy staff who had contracted COVID-19 (OR = 1.48, 95% CI 1.08–2.04; $p < 0.05$), and having received seasonal flu shot within the previous year (OR = 2.58, 95% CI 1.54–4.30; $p < 0.001$). There was no significant association between having a chronic disease that could be risk factor for COVID-19 (OR = 1.26; 95% CI: 0.78–2.04) and the intention of vaccination ($p > 0.05$).

Discussion

To the best of our knowledge, this is the first study in Turkey exploring the factors associated with the pharmacists' intention to receive COVID-19 vaccine. Almost third quarters of the participants had an intention to receive COVID-19 vaccine. HBM constructs were robustly predictive of the vaccination intention. Demographic characteristics (years of professional experience and gender), experience and risk factors related to COVID-19, and previous vaccination status were other predictors associated with the intention for COVID-19 vaccination.

In the present study, the rate of pharmacists' intention to receive COVID-19 vaccine was higher than the previous studies conducted among healthcare workers: 23.4% Taiwan [29], 27.7% in the Democratic Republic of the Congo [30], 50.5% in the Kingdom of Saudi Arabia [31], 52.5% [32] and 68.6% [33] in Turkey, 63.7% in the US [34], 67% in Italy [35], 40%–63% among nurses in Hong Kong [36, 37]. During the first wave of the COVID-19 pandemic, a higher vaccine acceptance (76.9%) had been reported in a study conducted among French healthcare workers (including pharmacists), and the rate of French pharmacists' intention to receive COVID-19 vaccine (88.8%) was higher than other health care workers [38]. However, Papagiannis et al. [39] identified the rate of pharmacists' intention to receive COVID-19 vaccine as 64.5% in the second wave of the pandemic, which was lower than our findings. A previous study reported the rate of Turkish healthcare workers' (including pharmacists) willingness to receive COVID-19 vaccine as 84.6% (the rate was 85.7% for the pharmacists) [40].

We need to be cautious in comparing these studies due to the differences in their methodologies. Even the period

of the study conducted, whether it was carried out during the first or the subsequent waves might have an impact on the findings. Still the vaccine intention rates in our study are higher compared to other studies except the one conducted in France during the first wave. This might be related to the relatively low vaccine hesitancy in Turkey compared to the western world.

In a systematic review [9], demographic variables including age and gender were identified as the most reported predictors for receiving influenza shots. Similar to the previous studies [5, 30, 37, 41, 42], men were more willing to receive COVID-19 vaccine than women in our study.

A recent systematic review conducted by Lin et al. pointed out that men were more receptive and eager to have COVID-19 vaccine [43]. According to the previous studies, gender was a significant factor for vaccine intention [5, 38, 44]. Our findings were in line with a previous study [45] which showed that professional years of experience was associated with willingness to get vaccinated. Contrary to our findings, Hasting et al. [46] and Toelntino et al. [47] did not find any relationship between professional experience and vaccination intention among pharmacists.

In line with the previous studies [6, 8, 25], it was determined that the four constructs of HBM scale (susceptibility, severity, benefit, and barriers) were strong predictors for the intention of receiving COVID-19 vaccination.

The risk and experience of COVID-19 could be also assessed as cues to action in subjects [7]. Similarly, it was found that perceived risk for COVID-19 was associated with intention towards COVID-19 vaccination [5]. In line with a previous study conducted on nurses [37], previous vaccine practices were also associated with positive intention towards COVID-19 vaccine.

This survey was conducted online and is prone to selection bias; pharmacists having vaccine hesitancy might have been unwilling to participate in our study. Past practices toward seasonal flu vaccination, risk, and experiences were also prone to recall bias. We only evaluated self-reported intention which might not be fully translated to vaccination practices. Furthermore, readers should also consider that vaccination intention is time-dependent, it might have changed after the vaccines came into use. Lastly causal information can't be drawn since this is not a longitudinal study.

Studies reveal that behavioural change techniques based on HBM were beneficial in leading to vaccine acceptance

Table 2 Factors associated with intention to receive COVID-19 vaccine, univariate analysis

	COVID-19 vaccine intention		<i>p</i>
	OR	CI 95%	
Age, years	1.03	(1.01–1.04)	<0.001
Gender			
Male	1.70	(1.22–2.36)	0.002
Female	Reference		
Professional experience as a pharmacist (years)	1.03	(1.01–1.04)	<0.001
Professional field			
Hospital Pharmacist	1.10	(0.76–1.59)	0.604
Community Pharmacist	Reference		
Living with elder family members at the same household			
No	1.18	(0.82–1.69)	0.372
Yes	Reference		
Living with other healthcare workers at the same household			
Yes	0.96	(0.71–1.30)	0.815
No	Reference		
Having a chronic disease associated with COVID-19 risk			
Yes	1.61	(1.02–2.53)	0.040
No	Reference		
Having had contracted COVID-19			
No	1.72	(1.17–2.52)	0.005
Yes	Reference		
Having relatives who had contracted COVID-19			
Yes	1.00	(0.75–1.34)	0.987
No	Reference		
Having a pharmacy staff who had contracted COVID-19			
Yes	1.25	(0.92–1.70)	0.155
No	Reference		

Table 2 (continued)

	COVID-19 vaccine intention		<i>p</i>
	OR	CI 95%	
Having close friends/relatives/colleagues who had died due to COVID-19			
Yes	1.11	(0.83–1.50)	0.483
No	Reference		
Having close friends/relatives/colleagues who had been hospitalized in the intensive care unit due to COVID-19			
Yes	1.21	(0.90–1.62)	0.200
No	Reference		
Having been in quarantine due to COVID-19 suspicions			
None	1.21	(0.86–1.70)	0.265
At least once	Reference		
Having used dietary supplements/vitamins/ minerals to prevent COVID-19			
Yes	1.06	(0.71–1.56)	0.790
No	Reference		
Having had received seasonal flu vaccine the previous season (Autumn–Winter 2019)			
Yes	2.96	(1.79–4.89)	<0.001
No	Reference		
HBM scale			
Perceived susceptibility	1.36	(1.16–1.58)	<0.001
Perceived severity	2.43	(1.95–3.03)	<0.001
Perceived benefits	13.29	(9.31–18.97)	<0.001
Perceived barriers	6.12	(4.71–7.95)	<0.001
Cues to action	0.98	(0.86–1.13)	0.805

Table 3 Factors associated with pharmacists' intention to receive COVID-19 vaccine, multivariate analysis

	COVID-19 Vaccine Intention			
	Model 1		Model 2	
	OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>
Gender				
Male	1.08 (0.67–1.76)	0.752	1.59 (1.13–2.23)	0.008
Female	Reference		Reference	
Professional experience as a pharmacist	1.02 (0.99–1.04)	0.061	1.02 (1.01–1.04)	0.003
HBM scale				
Perceived susceptibility	1.35 (1.07–1.70)	0.012		
Perceived severity	1.98 (1.42–2.77)	<0.001		
Perceived benefits	5.98 (4.05–8.84)	<0.001		
Perceived barriers	4.11 (2.92–5.78)	<0.001		
Cues to action	1.29 (0.99–1.68)	0.059		
Having had contracted COVID-19				
No			1.70 (1.14–2.54)	0.009
Yes			Reference	
Having a pharmacy staff who had contracted COVID-19				
Yes			1.48 (1.08–2.04)	0.016
No			Reference	
Having a chronic disease associated with COVID-19 risk				
Yes			1.26 (0.78–2.04)	0.343
No			Reference	
Having had received seasonal flu vaccine within the previous season (Autumn–Winter 2019)				
Yes			2.58 (1.54–4.30)	<0.001
No			Reference	

among health care workers [48–50]. A study held by Hayes et al. pointed out that HBM constructed intervention increased vaccination [51]. Our findings also show that HBM model is the strongest predictor for vaccination intention and could be used to develop behavioural change promoting vaccination.

Conclusion

This study highlights the factors related to the intention to receive COVID-19 vaccines among Turkish pharmacists. Our findings reveal that HBM is the strongest predictor for vaccination intention and could be used for the development of the potential behaviour change techniques to promote vaccination.

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