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Application of the health Belief Model to assess community preventive practices against COVID-19 in Saudi Arabia



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ABSTRACT

Background: The novel coronavirus disease (COVID-19) has affected hundreds of thousands of people across more than 200 countries. As the pandemic continues, the health agencies, worldwide, are recommending strict preventive practices to avert its transmission at community scale. We sought to predict the behavior of the Saudi population for adopting community preventive practices during the COVID-19 pandemic.

Methods: An online questionnaire consisting of 22 items pertaining to the Health Belief Model constructs was used to measure the perceived susceptibility and perceived severity of contracting COVID-19, along with the perceived benefits and perceived barriers to follow the Ministry of Health's recommendations. The outcome was assessed by their readiness to be compliant with the community protective measures. Data were analyzed using STATA at significance level of 0.05.

Results: A total of 900 individuals received the online survey link, of which 688 (response rate: 76.4%) respondents consented to participate in the study. The mean age of the respondents was 31.39 (SD = 8.94). Positive associations were observed between perceived susceptibility (Beta: 0.24; p value < 0.001), perceived severity (Beta: 0.16; p value < 0.001), perceived benefits (Beta: 0.41; p value < 0.001), cue to action (Beta: 2.61; p value < 0.001) and the participation in community preventive practices during the pandemic of the COVID-19.

Conclusions: Health belief model's constructs of perceived susceptibility, severity, benefits and cue to action can be adopted to help strengthen COVID-19 limiting behaviors and prevention programs which can delivered through community pharmacies in Saudi Arabia as well as around the world.

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Abbreviations: WHO, World Health Organization; HBM, Health Belief Model; MOH, Ministry of Health.

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1. Introduction

The world has yet again become witness of a major health crisis due to eruption of an infectious viral disease that has now reached to pandemic proportions. From the first case being detected in the Wuhan province in China, to its rapid spread across continents, the novel coronavirus disease (COVID-19) has shook the world with its startling contagious capability. Owing to its serious and sometimes fatal nature, the World Health Organization (WHO) declared COVID-19 as a public health emergency of international concern on the 30th of January 2020, which after 6-weeks was characterized as a pandemic (World Health Organization, 2020).

Even though, most countries have started the vaccination campaigns, there is still a long way until it reaches every individual. Vaccines have proved effective in protecting an individual from

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COVID-19 with variable efficacy depending on the type of vaccine used, but it is now understood that vaccinated individuals can still be infected and can spread the virus. For effective control of the pandemic around the world, community preventive measures (use of facemask and social distancing) are still at the forefront in this fight (Güner et al., 2020; Wise 2020; Nussbaumer-Streit et al., 2020; Wang et al., 2021). Countries across the world have not only issued directives to its people to stay at home, remain at least 1–2 m away from others (social distancing), and avoid any sort of public contact, but also are disseminating information about the preventive practices through all possible means (Sjödín et al., 2020; Wilder-Smith and Freedman 2020). Worldwide, many governments and health authorities have implemented strict measures including community lockdown, travel and movement restrictions, and cancelation of events and non-essential gatherings to combat the pandemic (Algaissi et al., 2020; Alshammari et al., 2020; Flaxman et al., 2020; Wang et al., 2020). In Saudi Arabia, community pharmacies being a vital component of the health-care system were exempted from closure. Community pharmacists have been imparting essential community services through provision of facemasks and sanitizers to the public (Ahmad et al., 2020). This aids the communities to follow the recommendations to wear face masks, frequently wash their hands or employ other hand hygiene techniques and avoid touching their faces to avoid or delay transmission of COVID-19 (Alzyood et al., 2020; Rader et al., 2021). For sure, these recommendations would severely hamper many day-to-day activities if implemented at a high level of fidelity, so voluntary compliance is likely to be uneven at best. Hence, there is a need to clearly understand the human behavior during COVID-19 outbreak in order to ensure that recommendations for preventive practices are properly followed.

1.1. Theoretical framework

In view of the current situation, we attempted to apply the Health Belief Model (HBM) as a theoretical framework to recognize the predictors that impact the decisions of the people to adopt preventive measures to curtail their risk of getting infected (Becker 1974; Champion et al., 2008; Hayden 2017). The HBM is a value expectancy framework that predicts and explains the preventive behavior individuals employ when engaging in a specific health behavior (Janz et al., 2002). It is further considered to be one of the most prominent public health frameworks for understanding the reasons that individuals may or may not act in the face of a threat to personal or community health. HBM models are widely used to study human behavior related to preventing or mitigating disease. Notably, individuals will presumably take preventative action if they perceive the health threat to be serious, find themselves to be personally susceptible and there are fewer barriers than benefits to engaging in such action (Laranjo 2016). We aimed to ascertain if the perception of susceptibility and severity of the novel coronavirus disease, and the benefits of the preventive measures outweigh the perceived barriers, which in turn affects their likelihood to practice and adhere to the preventive actions to restrict their risk of getting infected in Saudi Arabia. Further, the mental behavior of individual regarding the perception of COVID-19 and their association with the obligation to comply with recommendations can help in better designing the health initiative and programs.

2. Material and methods

2.1. Study design and setting

The present study was cross-sectional in design and collected data through an online survey in the early stage of the lockdown

period, April to May 2020. The online link to the survey was sent to general population aged 18 years and above residing in the northern, southern, central, eastern and western regions of Saudi Arabia. The population of Saudi Arabia is approximately 34 million (General Authority of Statistics 2020). This study was approved by Institutional Research Review and Ethics Committee, Jazan University and conducted in accordance with ICH GCP guidelines and the Declaration of Helsinki.

2.2. Data collection

Due to the social distancing measures, the data were collected through a self-reported online questionnaire link generated through Google Forms. Respondents were recruited through snowball (convenient, non-probability) sampling technique. The survey link was distributed to known contacts through the WhatsApp groups and was also shared online on Twitter and Snapchat. The students at the College of Pharmacy, Jazan University were asked to share the online survey link with their family, friends, relatives and acquaintances residing in different cities across the kingdom. The survey link was accompanied with a message wherein the participants were informed about the purpose of the study and were encouraged to first complete the questionnaire and were also requested to share the questionnaire with their friends and relatives. To ensure the eligibility of the respondents, the first page of the online questionnaire displayed the study title, purpose, inclusion criteria and informed consent of the study. The questionnaire covered demographic details and HBM constructs. The demographic information included age, gender, marital status, education, family income, number of adults and children in family, perception of health, comorbidities and medical history.

Based on current understanding of disease and concepts of preventive measures, we created an item pool including 22 items concerning the health beliefs about COVID-19 (Reynolds et al., 2008; Yang and Cho, 2017). The survey questionnaire was assessed and approved by the research committee of the College of Pharmacy, Jazan University. During the validation of questionnaire, three experts from Jazan University, Saudi Arabia assessed the English language questionnaire for content and face validity. Additionally, the questionnaire was sent to an epidemiologist and a public health professional to ensure the appropriateness of the language used and the correctness of terminology. The questionnaire was then translated into Arabic language by a professional expert which was again back translated to ensure the accuracy and constituency across languages.

This study evaluated six basic concepts of HBM: susceptibility, severity, benefit, barriers, cue to action, and outcome. Perceived susceptibility to contract the coronavirus disease was assessed by four items and the construct on the severity of the coronavirus disease included four items. In the construct of perceived benefits, two items were used to ask the respondents about the benefits of following the recommendations. The perceived barriers construct included four items related to self-confinement and social distancing. The respondents were also asked whether the community awareness program implemented by the Ministry of Health provided them with the required cue to action. The likelihood of the respondents to engage in community preventive practices was assessed by using seven items in the outcome construct. This is a 5-point Likert-type scale with the following responses: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree and each phrase had a score between one to five. The minimum and maximum scores for perceived susceptibility, perceived severity, and perceived barrier were 4 and 20. Likewise, minimum and maximum scores for perceived benefits, cue to action and outcome scores range from 2 to 10, 1 to 5 and 7–35,

respectively. The number of subjects with particular response for any specific question was added to calculate the final score.

2.3. Statistical analysis

The sample size was calculated using an online tool i.e. Raosoft® sample size calculator. With the margin of error of 5% and confidence level of 95%, we estimated a minimum sample to 385 considering the population size of 34 million and response distribution of 50% (Raosoft 2020). Data were analyzed using STATA version 15.1. The continuous variables were computed as mean ± SD while categorical variables were reported as frequency and percentage. A multiple linear regression was used to determine the associations between the perceived susceptibility, severity, benefits, cue to action and the engagement in community preventive practices. Also, the association of compliance with community protective measures and gender, marital status, education, income, perceived health and age was analyzed. The two-tailed $p < 0.05$ was considered as statistically significant.

3. Results

3.1. Demographic details

A total of 900 individual received the online link to the questionnaire, of which 688 (response rate: 76.4%) respondents consented to participate in the study. The geographical distribution of the study participants is illustrated in Fig. 1. Around 64% were male and 36% were female. The mean age of the respondents was 31.39 (SD = 8.94). Nearly half of the respondents were married, and the remaining half were single/divorced. Around two-thirds (70.3%) of the respondents had a bachelor's degree of education. Nearly, three-fourth (63.3%) of respondents had family income of more than 10,000 Saudi Riyals per month. Around 22% had no children, while nearly 40% of the respondents had one (20.2%) or two (21.0%) children. The remaining percentage (37%) of respondents had three or more children. Regarding the number of adults, there were only one or two adults in more than one-third (36.7%) of the households. A quarter of the households (25.9%) had three or four adults and more than one-third (37.4%) had five or more adults living in one household. Majority of the respondents (91%) assessed their health status as either very good or excellent and more than three fourth (78.74%) had no pre-existing conditions of medical history (Table 1).

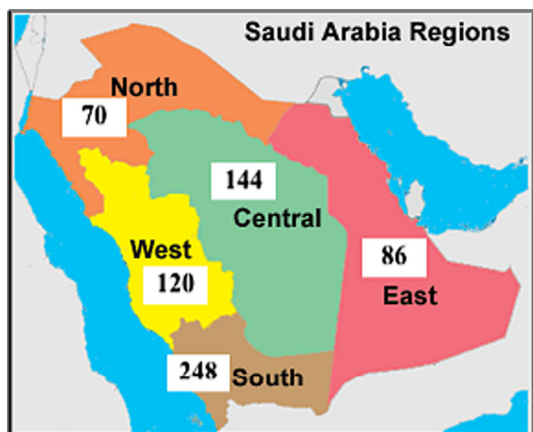


Fig.1. Geographical distribution of the study participants.

Table 1
Characteristics of the study sample (N = 668).

Variables	N	%
Gender		
Male	430	64.4
Female	238	35.6
Marital Status		
Married	351	52.4
Single/Divorced	317	47.6
Education		
Incomplete School	13	1.9
High School	89	13.3
Bachelors	473	70.8
Post graduate	93	13.9
Family Income in Saudi riyals		
<5000	97	14.5
5000 – 10,000	148	22.2
10,001 – 15,000	218	32.6
greater than15,000	205	30.7
Number of Adults in family		
1	32	4.8
2	213	31.9
3	75	11.2
4	98	14.7
≥5	250	37.4
Number of children in family		
0	146	21.9
1	135	20.2
2	140	21.0
3	87	13.0
4	60	9.0
≥5	100	15.0
What would you say about your health in general?		
Poor	3	0.45
Fair	2	0.30
Good	55	8.23
Very good	221	33.08
Excellent	387	57.93
Pre-existing conditions and medical history		
Blood pressure	31	4.64
Heart diseases	12	1.80
Diabetes	25	3.74
Immune diseases	6	0.90
Asthma	31	4.64
Other respiratory diseases	16	2.40
None	526	78.74
Other	43	6.44

3.2. Perceived susceptibility

The results have demonstrated high level of perceived susceptibility (mean ± SD, range: 13.66 ± 2.83, 4–20) about novel coronavirus pandemic in the respondents (Table 2). Approximately 89.67% (agreed/strongly agreed) of respondents had perceived susceptibility of contracting novel coronavirus if came in contact with any infected patient. Nearly one fourth (25.6%) of respondents had perception (agreed/strongly agreed) of contracting with coronavirus even without any contact with infected patient. Around one-third (33.08%) of participants had perception that their health gets severely damaged if came in contact with infected patient. Approximately 60.48% of respondents were agreed/strongly agreed that infection to coronavirus could hurt their relationship with their family, relatives and friends (Table 3).

3.3. Perceived severity

The results of perceived severity were also observed at higher level (mean ± SD, range: 12.85 ± 2.72, 4–20) (Table 2). More than half (58.98%) of respondents agreed/strongly agreed with the perception that novel coronavirus is more severe than any other respiratory diseases. The degree of perceived severity among respondents was substantially higher as approximately half (51.65%) of them would not go to hospital even after falling ill with

Table 2
Mean scores of HBM variables.

HBM variables	Mean ± SD	Max-Min	Range
Perceived susceptibility	13.66 ± 2.83	4–20	4–20
Perceived Severity	12.85 ± 2.72	4–20	4–20
Perceived Benefits	8.18 ± 1.54	2–10	2–10
Perceived Barriers	13.17 ± 3.76	4–20	4–20
Cue to Action	4.46 ± 0.67	1–5	1–5
Outcome score	29.92 ± 4.29	12–35	7–35

another disease. In addition, nearly three-fourth (76.8%) had perception that coronavirus can inflict serious damage to their community and 50% of them had neutral perception that coronavirus may spread in the world and Saudi Arabia again someday (Table 3).

3.4. Perceived benefits

The perceived benefit score about complying to the Ministry of Health's (MOH) guideline of COVID-19 was reported at higher level

Table 3
Responses of respondents for each HBM constructs (N = 668).

HBM Constructs	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly Agree N (%)
Perceived Susceptibility (In the current situation of Novel Corona Virus 2019 pandemic, I think that)					
1) I will contract Coronavirus if I come into contact with a Coronavirus infected patient	17 (2.54)	7 (1.05)	45 (6.74)	286 (42.81)	313 (46.86)
2) I think that I might contract Coronavirus even if I do not come into contact with a Coronavirus infected patient.	186 (27.84)	174 (26.05)	137 (20.51)	126 (18.86)	45 (6.74)
3) My health will be severely damaged if I contract Coronavirus	28 (4.19)	80 (11.98)	250 (37.43)	221 (33.08)	89 (13.32)
4) If I got sick from Corona, it could hurt my relationship with my family, relatives and friends.	86 (12.87)	91 (13.62)	87 (13.02)	239 (35.78)	165 (24.70)
Perceived Severity (Regarding the Novel Corona Virus 2019 pandemic, I feel that)					
5) Coronavirus is more severe than any other respiratory diseases.	47 (7.04)	107 (16.02)	120 (17.96)	233 (34.88)	161 (24.10)
6) Even if I fall ill with another disease, I will not go to hospital because of Coronavirus.	195 (29.19)	150 (22.46)	133 (19.91)	138 (20.66)	52 (7.78)
7) Coronavirus will inflict serious damage to my community.	19 (2.84)	32 (4.79)	104 (15.57)	309 (46.26)	204 (30.54)
8) Coronavirus may spread in the world and Saudi Arabia again someday.	76 (11.38)	140 (20.96)	334 (50.0)	89 (13.32)	29 (4.34)
Perceived Benefits (In the current situation of Novel Corona Virus 2019 pandemic, If I followed the recommendation)					
9) I will not get infected with Coronavirus	16 (2.40)	30 (4.49)	143 (21.41)	259 (38.77)	220 (32.93)
10) I can stop spreading the disease	8 (1.20)	12 (1.80)	85 (12.72)	277 (41.47)	286 (42.81)
Perceived Barriers due to self-home confinement (Due to self-home confinement, I faced the following difficulties due to)					
11) Not going out of house to socialize	48 (7.19)	92 (13.77)	126 (18.86)	266 (39.82)	136 (20.36)
12) Not going out of house for household needs	65 (9.73)	177 (26.50)	180 (26.95)	202 (30.24)	44 (6.59)
13) Taking care of children (if in household)	94 (14.07)	129 (19.31)	140 (20.96)	181 (27.10)	124 (18.56)
14) Staying in house with door closed	64 (9.58)	94 (14.07)	108 (16.17)	244 (36.53)	158 (23.65)
Cue to Action					
15) The Coronavirus Awareness Program from the MOH helped me practice the community preventive measures to prevent the spread of Coronavirus	2 (0.30)	3 (0.45)	44 (6.59)	256 (38.32)	363 (54.34)
Outcome (In order to prevent myself and my family, I am compliant to the following community protective measures)					
16) Will not go out of house to socialize	2 (0.30)	3 (0.45)	28 (4.19)	200 (29.94)	435 (65.12)
17) Will not attend important events	1 (0.15)	8 (1.20)	33 (4.94)	187 (27.99)	439 (65.72)
18) Use mask for any health-care visits	7 (1.05)	20 (2.99)	52 (7.78)	208 (31.14)	381 (57.04)
19) Use mask when answering the door	27 (4.04)	70 (10.48)	149 (22.31)	233 (34.88)	189 (28.29)
20) Use mask outdoors when others are present	22 (3.29)	77 (11.53)	146 (21.86)	229 (34.28)	194 (29.04)
21) Will not allow visitors into home	6 (0.90)	15 (2.25)	85 (12.72)	237 (35.48)	325 (48.65)
22) Will not go to public places for spending time with my family	2 (0.30)	5 (0.75)	28 (4.19)	191 (28.59)	442 (66.17)

(mean ± SD, range: 8.18 ± 1.54, 2–10) (Table 2). A larger proportion (71.7%) of respondents believed (agreed/strongly agreed) of not getting infected with coronavirus when complying with the MOH instructions. Also, majority (84.28%) of them agreed/strongly agreed that they can stop spreading disease after adopting the recommendations (Table 3).

3.5. Perceived barrier (due to self-home confinement)

The perceived barriers for adopting preventive behaviors was also found at higher level (mean ± SD, range: 13.17 ± 3.76, 4–20). Around 60.18% of respondents agreed/strongly agreed of facing difficulties due to not going out of house to socialize during home confinement. Whilst 36.83% of respondents not going out of house for household needs. Less than half (45.66%) respondents had facing difficulty in taking care of child while more than half (60.18%) had faced difficulty in staying house with door closed (Table 2).

3.6. Cue to action

The mean scores of cues to action was found at higher (mean ± SD, range: 4.46 ± 0.67, 1–5) level (Table 2). Majority (92.66%) of respondents agreed/strongly agreed that coronavirus awareness program from the MOH helped them practice the community preventive measures to spread of coronavirus (Table 3).

3.7. Compliance

The results have shown high level of compliance among respondents in practicing community protective measures to prevent the contraction of coronavirus (mean ± SD, range: 29.92 ± 4.29, 12–35) (Table 2). Majority of respondents (agreed/strongly agreed) showed compliance with not going out of their houses to socialize (95.12%), attend important events (93.71%) and to public places with family (94.76%). Most of respondents also showed compliance with use of mask during any health-care visits (88.18%), answering the door (63.17%), and in outdoors when others are present (63.32%). A greater proportion of respondents (84.13%) were in compliance of not allowing visitors into home during COVID-19 (Table 3).

3.8. Association between respondents' perception and community preventive practices

A multiple linear regression was run to predict the association of compliance with community protective measures from perceived susceptibility score, severity score, benefit score, cue to action, gender, marital status, education, income, perceived health and age. Statistically significant positive associations were observed between perceived susceptibility (Beta: 0.24; p value < 0.001), perceived severity (Beta: 0.16; p value < 0.001), perceived benefits (Beta: 0.41; p value < 0.001), cue to action (Beta: 2.61; p value < 0.001) and the participation in community preventive practices (Table 4).

4. Discussion

Until today, prevention remains the mainstay in the treatment, containment and controlling of the COVID-19 pandemic in Saudi Arabia. Given the importance of person to person transmission in the spread of COVID-19 outbreak, it is critically important to assess

the human behavior with respect to infection prevention. This online survey evaluated the preventive behavior against the spread of COVID-19 based on the HBM constructs in the Saudi population. Here, we analyzed the perceived susceptibility and perceived severity of contracting the COVID-19 along with the perceived benefits of and perceived barriers to adhere to the MOH's prevention recommendations.

Our results demonstrate that perceived susceptibility and severity of most of respondents was high about COVID-19. This indicates that respondents knew they were at the risk of getting contracted with COVID-19 and feel threatened with the severity of disease. Subsequently, they would adopt the preventive measures due to high level of perceived benefits which indicates that these behaviors were effective and can be applicable to Saudi population.

Among the factors that determine the possibility of health protective behaviors in the HBM, we observed that individuals' perception of personal risks, as demonstrated by perceived sensitivity and severity, regarding COVID-19, had significant positive associations (p < 0.001) with community preventive practices. The positive perceptions are possibly due to improved awareness and extraordinary measures taken to prevent the spread of the COVID-19 by health ministry of Saudi Arabia (Yezli and Khan 2020). Recognizing the potential threat of mass infection, Saudi Arabia took the unprecedented step by cancelling the annual mass (religious congregation i.e. Hajj and Umrah) gathering and initiating a rigorous community prevention campaign to educate and prepare the public in its fight against the novel coronavirus disease from the time it was first detected (Ahmed and Memish 2020; Yezli and Khan 2020). These included measures for social distancing and frequent hand washing or employ other hand hygiene techniques and avoid touching their faces to avoid or delay transmission of COVID-19 (Yezli and Khan 2020). In addition, Saudi Arabia announced the closure of schools and universities in first week of March, banned the inbound travel from COVID-19 affected countries and restricted travelling from and to the neighboring gulf countries (Al-Tawfiq and Memish 2020). These social precautions for preventing COVID-19 spread in Saudi Arabia has raised the public awareness regarding the perception of threat with COVID-19 and its severity. In our survey, more than half (58.98%) of respondents had perception that COVID-19 is more severe than any other respiratory diseases. This also could be due to the fact that, while doing this survey, world has already witnessed the fatal outcome of COVID-19 as several deaths was already been reported

Table 4

Association of perception of subjects and community preventive practices using multiple linear regression.

	Beta	SE	t	p value	95% CI
Susceptibility score	0.24	0.05	4.51	<0.001	0.14–0.35
Severity score	0.17	0.06	2.93	0.004	0.05–0.28
Benefits score	0.42	0.10	4.19	<0.001	0.22–0.61
Cue to action	2.61	0.23	11.37	<0.001	2.16–3.07
Effect on relationships	−0.12	0.11	−1.11	0.27	−0.33–0.09
Gender (Female vs Male)	−0.35	0.31	−1.14	0.25	−0.96–0.25
Marital status					
Separated/widowed vs Married	0.30	0.73	0.41	0.68	−1.14–1.75
Never Married vs Married	0.77	0.39	1.97	0.05	0.003–1.54
Education					
High school vs < High school	0.30	1.09	0.28	0.78	−1.83–2.44
College degree vs < High School	0.39	1.04	0.38	0.70	−1.65–2.44
Postgraduate degree vs high school	−0.07	1.10	−0.07	0.94	−2.23–2.08
Family income					
5000–10000 vs < 5000	−0.14	0.48	−0.28	0.78	−1.08–0.81
10000–150000 vs < 5000	0.18	0.45	0.4	0.69	−0.71–1.07
>15000 vs < 5000	−0.16	0.47	−0.33	0.74	−1.09–0.78
Perceived health status (excellent/very good vs fair/poor)	−0.21	0.50	−0.43	0.67	−1.20–0.76
Age, years	0.02	0.02	1.15	0.25	−0.02–0.07

Abbreviations: SE: standard error, CI: Confidence interval.

from different parts of the world and number of infected persons were alarmingly increasing suggesting a fast transmission rate of coronavirus that other respiratory diseases.

Implementation of COVID-19 guidelines and health preventive campaign have been instrumental in the fight with coronavirus. Notably, countries with early implementation of social preventive practices have significantly reduced the spread of the disease and flattened their epidemic curves (Fisher and Wilder-Smith 2020; Lee et al., 2020). The Ministry of Health (MOH) communication efforts proved effective and created confidence and trust in Saudi population. Results show that a large proportion of respondents had perceived benefit when adapting the guideline of the MOH. Majority of respondents had strong perception that coronavirus awareness program from the MOH would be helpful in the prevention of transmission of virus. The bold and decisive steps of suspending the Umrah mass gathering for the first time in many decades has delayed the epidemic peak and certainly minimized the spread of pandemic virus (Yezli and Khan 2020). In a further step to combat the situation, the MOH has also announced that the COVID-19 vaccine will be administered for free to all of its citizens and residents (Almaghaslah et al., 2021).

It is worth noting that individuals' perception about community preventive behaviors was at the higher level; in addition, all the variables of the HBM, except perceived barriers, had a significant correlation with individual performance which has also been proved in other studies HBM based studies (Najimi and Golshiri 2013; Barakat and Kasemy 2020). It is now clear from recommendations from different societies/guidelines that effective mitigation of the disease will require nontrivial efforts including social distancing and avoiding unnecessary interactions with others. In our survey, we observed more than 85% of respondents are compliant to the community protective measures of not going out of house to socialize, attend important events and use mask for any healthcare visits. The exemption of community pharmacies from closure has proved crucial in the efforts to curb the spread of the disease. This helped the public in timely refilling of prescription medications which reduced the risk of exposure to COVID-19 (Ahmad et al., 2020). In order to speed up the inoculation program, the MOH has partnered with community pharmacies to provide the approved COVID-19 vaccines free of charge to the public (Assiri et al., 2021). The perceived barrier of not going out of house to socialize during home confinement, or challenges in taking care of child or in staying house with door closed is of modest level in our study which are as negative perceived aspects of adopting preventive behaviors. Also, no significant association between the perceived barrier score and individual effort to participate community preventive measures indicates that the benefits of preventive actions for these behaviors are more than the perceived barriers. However, the greater adherence to the lifestyle modifications suggested by healthcare and public health organizations is of utmost importance to limit the spread of COVID-19 and will greatly delay the spread of the disease.

This study is first of its kind which has evaluated the individual's perception towards community preventive practices, based on HBM. However, the present study had its share of limitations. Although the questionnaire was distributed among the five geographical regions, the findings of this study cannot be generalized for two reasons. Firstly, as the study was from southern region, the online questionnaire received more responses from this region. Secondly, the sample was representative of a younger population with the majority holding a bachelor's degree. In addition, as face-to-face interviews were not possible due to the pandemic situation, we were not able to obtain the responses from people who were uneducated and/or less proficient with smartphone usage. All data were self-reported and may be subject to social desirability

bias. Also, due to the lack of a valid HBM instrument, the questionnaire was designed with consideration for the scientific comments of relevant experts and based on literature reviews.

5. Conclusions

The results of our study demonstrate the efficacy of the HBM constructs to assess the likelihood of the community to perform a required preventive action. The results show that perceptions related to susceptibility, severity and benefits in addition to the cue to action are significantly associated with the engagement in community preventive practices in Saudi Arabia during the pandemic of the novel coronavirus disease. Therefore, we recommend that the inclusion of these components for assessment of disease prevention programs. Community pharmacists are placed strategically to implement health promotion campaigns in Saudi Arabia and also around the world as they can regularly emphasize on the benefits of the preventive practices during outbreaks, epidemics and pandemics.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Contributions

MHS conceptualized the study, designed the study questionnaire and drafted the initial version of the manuscript, AKM did the data analysis and critically reviewed the final version of the manuscript. AY prepared the final version of the manuscript. AAA, SQ, NKS, MAA and NA prepared the methodology, collected the data and performed the data curation. All authors agreed and approved of the final version before submission.

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Availability of data and materials

Relevant data can be obtained from the corresponding author upon reasonable request.

Ethics approval

The Institutional Research Review and Ethics Committee in Jazan University reviewed and approved this study and all its procedures.

Consent for publication

Not applicable.

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