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ORIGINAL RESEARCH

Health Literacy, Perceived Threat, and Posttraumatic Stress Disorder During the COVID-19 Pandemic in Saudi Arabia

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Purpose: This study aimed to investigate the prevalence of and factors associated with posttraumatic stress disorder (PTSD) during the COVID-19 pandemic in Saudi Arabia.

Materials and Methods: This was a cross-sectional online survey that targeted adults over the age of 18 residing in Saudi Arabia. The data collection began June 1, 2020 and continued for four weeks. The Posttraumatic Stress Disorder Checklist-Specific, the Brief Illness Perception Questionnaire version BIP-Q5, and a 9-item health literacy measure were used.

Results: There were 1249 participants, of which 62.21% were under the age of 34. The prevalence of PTSD was 19.5% among all participants. The results showed that both the perception of threat (*OR* =1.17, 95% *CI* = 1.13−1.19) and health literacy (*OR* =0.97, 95% *CI* = 0.95−0.99) were associated with PTSD symptoms.

Conclusion: This study highlights important findings that the level of an individual's perception of threat and health literacy is associated with symptoms of PTSD. Thus, an understanding of these constructs in the target population will enable the development of better measures designed to reduce the psychological impact of the COVID-19 pandemic.

Keywords: COVID-19, Saudi Arabia, posttraumatic stress disorder, perception, health literacy

Introduction

The spread of the COVID-19 pandemic represents one of the most significant public health crises that Saudi Arabia and the world have faced in decades. A total of 284,226 infected cases and 3055 confirmed deaths were reported in Saudi Arabia by August 6, 2020. Due to the rapid spread of COVID-19, the governments of numerous countries worldwide have implemented a series of preventive measures, including curfew regulations, restricted traveling, social distancing, and mandatory hygiene rules.[1] These combined measures have slowed the spread of the COVID-19 outbreak.[2] Furthermore, several studies have demonstrated that psychological sequelae are associated with the pandemic; they revealed numerous psychological outcomes, including anxiety, depression, stress, confusion, and frustration.[3–6]

A recent study has highlighted the psychological impact of the pandemic among adults in China. The authors reported that three-quarters of the participants expressed fears about their family contracting the disease.[6] Besides, 28.8%, 16.5%, and 8.1% of the participants reported moderate to severe symptoms of depression, anxiety, and stress, respectively.[6] Although psychological symptoms

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are common and natural reactions among people experiencing a public health crisis that disrupt their daily and social activities, Liu and colleagues have reported that infectious disease outbreaks can be traumatic events for some people and could lead to posttraumatic stress disorder (PTSD).[7] Liu and colleagues reported that 7% of their study sample met the diagnostic criteria of PTSD following the COVID-19 pandemic in Wuhan and surrounding cities in China.[7] Findings from earlier studies also show that some people develop PTSD following infectious outbreaks.[8–10] For instance, one study found that 18% and 13.3% of women and men, respectively, reported symptoms of PTSD following the severe acute respiratory syndrome (SARS) epidemic.[9] While there are similarities between the COVID-19 pandemic and the SARS epidemic, the COVID-19 pandemic has spread more widely and has led to a far greater number of hospitalizations and deaths worldwide. COVID-19 is far from just a health crisis; it has shaken societies and economies to their core.[11]

While pandemics can be a stressful experience for all people, research indicates that fear increases stress and anxiety and may lead to emotional disorders.[12,13] The perception of threat to one's health is an important concept to facilitate understanding of people's reactions to stressful events. The perception of threat is based on two main constructs: 1) perceived susceptibility, which is the likelihood of contracting the disease, and 2) perceived severity, which is the negative consequences the disease has on one's life.[12] This concept of disease influences one's interpretation of the traumatic events that are conditioned by previous experience as well as by the social and cultural context.[14] The association between the perception of threat and emotional and mood alteration is well documented in the literature. For example, multiple studies have reported that psychological disorders can be attributed to the high perception of a disease's threat.[13,15]

The general public's accessibility to information related to this pandemic via social media combined with widespread misinformation has become a double-edged sword.[16] Nowadays, people acquire, analyze, and act based on medical information from unreliable social media sources. This raises the question of health literacy's role in the level of psychological impact and distress experienced during this pandemic. Low levels of health literacy have remained a major issue worldwide, despite tremendous healthcare advancements in recent decades.[17] Studies from the United States and Europe have shown low health literacy levels in the general population, ranging from 26%–47%.[18,19] One study in Vietnam surveyed 3947 participants with and without a COVID-19 diagnosis and found that higher health literacy was associated with lower depressive symptoms.[20]

Limited evidence exists about the psychological impact of the COVID-19 pandemic on the general population in Saudi Arabia. Thus, this study aimed to investigate the prevalence of PTSD symptoms, the perception of threat, and health literacy among Saudi Arabian adults. Insight into how the perceptions of emerging disease outbreaks and the level of health literacy influence people's mental health are essential in understanding the impact of such an outbreak on people's lives. This may contribute to better management of the adverse health and social impact of the COVID-19 pandemic.

Materials and Methods

Study Design, Period, and Population

This was a cross-sectional online survey (distributed in the Arabic language) targeting Saudi Arabian residents aged 18 or older. We recruited a convenient sample through social media advertisements. The data collection began June 1, 2020 and continued for four weeks. This study was approved by the Umm Al-Qura University institutional review board (approval no. HAPO-02-K-012-2020-06-394); all participants provided electronic informed consent before participation. This study was conducted in accordance with the Declaration of Helsinki.

Sample Size Calculation

The study sample was calculated to be 384 using Epi info® version 7 with the following input: the assumed proportion of PTSD among 50% of the population (since there was no previous study that has examined the prevalence of PTSD symptoms in the general population of Saudi Arabia to use as reference), a confidence level of 95%, and a margin of error of 5%.

Instruments

Sociodemographic Characteristics

The participants were asked to provide basic demographic information, including age, gender, educational level, region, and income. Further, we asked participants if they had a history of mental health problems or other chronic conditions.

Posttraumatic Stress Disorder Measure

The Posttraumatic Stress Disorder Checklist-Specific (PCL-S), a valid measure consisting of 17 items, was used to assess PTSD symptoms.[21] Participants were asked to indicate the extent to which they were bothered by their experience with this pandemic in the past month, with response options ranging from "1" (Not at all) to "5" (Extremely). A total summary score was calculated by summing responses to each option, ranging from 17 to 85. Based on the recommendation of the National Center for PTSD, several methods were employed to score the PCL-S:[22] 1) set a cut-off score of 45 or higher as indicating the presence of PTSD symptoms; 2) determine if individuals meet the Diagnostic and Statistical Manual of Mental Disorders criteria (DSM-IV) as defined by one item from questions 1−5, three items from questions 6 −12, and two items from questions 13−17 being rated "3" or above; and 3) a combination of the previously mentioned methods.

Perception of Threat Measure

The perception of threat was measured using the Brief Illness Perception Questionnaire, version BIP-Q5.[14,23] The BIP-Q5 consists of five items that assess people's perception of threat regarding the COVID-19 outbreak on a Likert-type scale ranging from 0 to 10. This instrument provides a summary score on the individual's perception of the pandemic. The higher the score, the greater perception of the pandemic as a threat.

Health Literacy Measure

The health literacy level was measured using a 9-item questionnaire on the ease or difficulty of finding information related to the pandemic, understanding and following authorities' recommendations, judging the reliability of information from the media, judging when one needs to go to the doctor, and deciding when to engage in social activities.[24] The participants rated their response on a 7-point Likert-type scale ranging from "very difficult" to "very easy." A summary score was computed, and a high score indicated a high literacy level.

Statistical Analysis

Descriptive statistics were generated for sociodemographic variables, PTSD symptoms, threat perception level, and health literacy level. Quantitative variables were expressed as means ± standard deviation and qualitative variables as frequencies and percentages. Associations between the perception of threat and health literacy and the PCL-S scores were examined via univariable analyses using Pearson correlation analysis. To identify possible risk and protective factors of PTSD symptoms, stepwise multivariable logistic regression analysis was performed for each of the PCL-S scoring methods (dependent variable). Sociodemographic variables, perception of threat level, and health literacy level were entered as predictors (independent variables). The threshold for significance was set at $p < 0.05$. Data analyses were conducted using SAS 9.4.

Results

Table 1 shows descriptive statistics for the sociodemographic variables of the 1249 participants. Approximately 62.21% of

Table 1 Demographic Characteristics of the Study Sample

Demographic Characteristics	Frequency (%)
Age	
18–24	310 (24.82)
25–34	467 (37.39)
35–44	309 (24.74)
45–54	130 (10.41)
≥ 55	33 (2.64)
Gender	
Male	620 (49.64)
Female	629 (50.36)
Marital Status	
Single	550 (44.04)
Married	658 (52.68)
Divorced/widowed	41 (3.28)
Income	
Low income	469 (37.55)
Upper low income	178 (14.25)
Middle income	194 (15.53)
Upper middle income	278 (22.26)
High income	130 (10.41)
Education	
Less than High school	26 (2.08)
High school	204 (16.33)
College	768 (61.49)
Postgraduate	251 (20.10)
Region	
Northern region	139 (11.13)
Middle region	219 (17.53)
Southern region	125 (10.01)
Western region	680 (54.44)
Eastern region	86 (6.89)
History of mental illness	46 (3.68)
History of chronic conditions	162 (12.97)

the study participants were under the age of 34. The respondents consisted equally of men (49.64%) and women (50.36%). The majority of the participants were married (52.68%). Furthermore, most of the participants were well educated, with 61.49% and 20.10% having a college degree or a postgraduate degree, respectively. This sample's level of income was diverse, with 37.55% reporting a low-income rate of 1000 Saudi Riyals (267 USD). Only 3.68% of the participants reported a history of mental health issues, while 12.97% reported a history of chronic health conditions. The mean and standard deviation of the PCL-S score was 35.5 ± 12.7 (range: 17–85). The prevalence of PTSD symptoms using a PCL-S score cut-off of ≥ 45 was 22.66%. Furthermore, the prevalence of PTSD symptoms using the DSM-IV criteria and the combination of the previously mentioned methods was 24.82% and 19.54%, respectively.

The results revealed a moderate perception of threat among the study participants on most of the BIP-Q5 items, with a mean score ranging from 4.2 to 5.5 (Table 2). Specifically, participants had a higher perception of threat when asked about the consequences of the COVID-19 pandemic on their life (5.5 ± 2.8). The overall mean score on the BIP-Q5, with a high score indicating a high perception of threat, was 22.0 ± 12.7 (range: 0–49). Furthermore, the results show that the BIP-Q5 items and summary score were strongly correlated with the PCL-S score. For instance, the emotional response to the pandemic was strongly and positively correlated with the PCL-S score ($r = 0.68$, $p < 0.001$).

The results also revealed a high level of health literacy among the participants, with a mean and standard deviation equal to 55.2 ± 8.0 (range: 9–63, Table 3). While most tasks addressed by the health literacy questionnaire are easy for the majority of the participants (mean score range from 5.5 to 6.5), it was easiest to "understand what authorities say about COVID-19 restrictions and recommendations," "judge whether the information about COVID-19 in the media is reliable," and "follow the recommendations on how to protect yourself from COVID-19." Furthermore, the majority of health literacy items showed a small but significant inverse correlation. For instance, the results indicated an inverse relationship between the PCL-S score and health literacy level ($r = -.18$, $p < 0.001$).

Table 4 displays the results of the three stepwise logistic regression analyses. The models were adjusted for socio-demographic characteristics, perceived threat, and health literacy. The predictors that were consistently significant in the three models were perceived threat, health literacy, marital status, and history of mental illness. Specifically, those who reported a high level of perceived threat were more likely to have PTSD symptoms (*OR* =1.17; 95%, *CI* = 1.13−1.19, $p < 0.001$). However, those who reported a high level of health literacy were less likely to have PTSD symptoms (*OR* = 0.97, 95% *CI* = 0.95−0.99, $p < 0.001$). Furthermore, the model results that estimated PTSD symptoms using a combination of PCL-S cut-off score and DSM-IV criteria showed that participants who reported a history of mental illness were four times more likely to have PTSD symptoms (*OR* =4.20; 95%, *CI* = 1.93−9.15, $p < 0.001$).

Table 2 Mean and Standard Deviation of BIPQ-5 Items and Correlation with PCL-S Score

BIPQ-5[a]	*M* ± *SD*	*r*	*p*
Consequences	5.5 ± 2.8	0.53	< 0.001
Timeline	5.1 ± 2.5	0.19	< 0.001
Identity	1.9 ± 2.6	0.34	< 0.001
Concern	5.2 ± 3.0	0.54	< 0.001
Emotional response	4.2 ± 3.3	0.68	< 0.001
Total BIPQ-5 score	22.0 ± 12.7	0.66	< 0.001

Note: BIPQ-5[a], the Brief Illness Perception Questionnaire, version BIP-Q5, *SD*.

Table 3 Mean and Standard Deviation of Health Literacy Items and Correlation with PCL-S Score

Health Literacy Items	*M* ± *SD*	*r*	*p*
Find information about symptoms of COVID-19	6.2 ± 1.2	− 0.09	0.003
Understand what authorities say about the virus COVID-19	6.3 ± 1.2	− 0.08	0.006
Understand what authorities say about COVID-19 restrictions and recommendations	6.5 ± 1.2	− 0.13	< 0.001
Judge whether the information about COVID-19 in the media is reliable	6.5 ± 0.9	− 0.11	< 0.001
Follow the recommendations on how to protect yourself from COVID-19	6.5 ± 1.0	− 0.14	< 0.001
Judge when you need to go to the doctor for non-COVID-related problems, and when not to	5.5 ± 1.8	− 0.13	< 0.001
Decide when to engage in social activities, and when not to	5.5 ± 1.7	− 0.15	< 0.001
Decide when to stay at home from work/school, and when not to?	5.8 ± 1.6	− 0.14	< 0.001
Find out about political decisions on restrictions related to COVID-19	6.3 ± 1.1	− 0.13	< 0.001
Total Health literacy score	55.2 ± 8.0	− 0.18	< 0.001

Table 4 The Association Between PTSD and BIP-Q5 and Health Literacy

	Method 1		Method 2		Method 3	
	***OR* (95% *CI*)**	***p***	***OR* (95% *CI*)**	***p***	***OR* (95% *CI*)**	***p***
Marital status						
Divorced/Widowed	2.47 (1.01–6.04)	0.048	2.51 (1.05 −6.01)	0.038	2.83 (1.12–7.17)	0.028
Married	1.42 (1.00–2.01)	0.050	1.38 (0.99–1.93)	0.060	1.55 (1.07–2.25)	0.022
Single	Ref		Ref		Ref	
History of mental illness						
Yes	3.53 (1.64–7.61)	0.001	2.98 (1.40–6.34)	0.005	4.20 (1.93–9.15)	< 0.001
No	Ref		Ref		Ref	
BIP-Q5	1.17 (1.14–1.19)	< 0.001	1.15 (1.13–1.18)	< 0.001	1.17 (1.15–1.20)	< 0.001
Health Literacy	0.97 (0.95–0.99)	0.002	0.97 (0.95–0.99)	< 0.001	0.96 (0.94–0.98)	< 0.001

Notes: Method 1: a cut-off score of 45 or higher indicates the presence of PTSD symptoms; Method 2: determine if individuals meet the Diagnostic and Statistical Manual of Mental Disorders criteria (DSM-IV) as defined by one item from questions 1−5, three items from questions 6−12, and two items from questions 13−17 rated "3" or above; and Method 3) a combination of method 1 and method 2.

Discussion

The results of this study highlighted the psychological impact of the COVID-19 pandemic on the general population in Saudi Arabia. Approximately one-fifth of the participants reported symptoms of PTSD. In light of this finding, one study examining the psychological impact of the COIVD-19 pandemic on the general population in Saudi Arabia found that 28.3%, 24%, and 22.3% of participants reported symptoms of depression, anxiety, and stress, respectively.[25] Furthermore, the prevalence rate of PTSD in our sample was considerably lower compared to similar studies from other countries. For instance, a recent study in the United States found that 31.8% of the respondents had PTSD symptoms.[26] Similarly, a study in Italy found that the prevalence of PTSD was 29.5% among the general population.[27] On the contrary, a study in China found PTSD symptoms in only 7% of the participants.[7] This variability can be attributed to many factors,[28] including, but not limited to, the level of perceived threat and level of health literacy.

This study indicates that the perception of threat regarding the COVID-19 pandemic is positively associated with increased risk of PTSD symptoms. These findings are consistent with previous literature, which shows that perceived threat increases stress, which subsequently may even lead to the development of emotional disorders.[29,30] Additionally, a higher perception of threat can alter one's affective state and mood. A recent study in Spain found that the perceived threat of the COVID-19 pandemic was positively associated with negative emotional states such as anxiety, depression, and anger.[31] Another study found that threat perception was high in 10 countries across Asia, the Americas, and Europe. They reported that environmental and sociocultural factors explain variance in risk perception. They also reported that direct experience with the virus leads to higher risk perception.[32] This is consistent with literature that indicates that the perceived personal vulnerability to an outbreak increased individual perception of threat, which has been generally linked to emotional and psychological disorders.[33,34]

This study also found that health literacy plays a vital role in predicting the psychological impact of such a pandemic on the general population. We found that a higher level of health literacy was negatively associated with PTSD symptoms. This is consistent with current literature regarding the association between health literacy and mental health during the COVID-19 pandemic. One study found that individuals with high health literacy levels were less likely to be depressed.[20] Another study in the United States found that people with inadequate health literacy were less likely to perceive their susceptibility to the COVID-19 infection. Additionally, people with a low level of health literacy are less likely to know COVID-19 symptoms and more likely to report feeling unprepared for the pandemic.[35] It is imperative that more attention be paid to health literacy in COVID-19 public health messaging, which has implications for both the spread of the pandemic and the well-being of the general population.

This study had several limitations. We used a convenience sampling method, which may limit the ability to generalize our results to the entire population of Saudi Arabia. Those who cannot read Arabic or do not have access to the internet could not participate in the

survey. Further investigation is needed to include a more diverse sample that represents the entire Saudi Arabian population. Furthermore, caution should be practiced in generalizing the study findings to other populations in different countries. Although the instruments used in this study have been validated in other countries, we did not have enough resources to validate these measures in Saudi Arabia. Future research should consider other factors that might contribute to emotional disorders, perception of threat, and health literacy, including access to information, social support, experience with a traumatic event, and preparedness level.

Conclusion

To our knowledge, this the first study that examined the association between perception of threat, health literacy, and PTSD symptoms in the general population of Saudi Arabia during the COVID-19 pandemic. We found that one in five participants reported symptoms of PTSD. Significantly, we also found that health literacy to be negatively associated and perception of threat to be positively associated with PTSD symptoms. Public health messages and interventions must incorporate these constructs to mediate the negative effects of COVID-19 on mental health.

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Disclosure

The authors reports no conflicts of interest in this work.

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