COVID-19 precautionary behavior among Israeli breast cancer patients

Shiri Shinan-Altman[1] · Inbar Levkovich[2]

Abstract

Objective Cumulative knowledge indicates that cancer patients, among them breast cancer patients, are more susceptible to COVID-19 than individuals without cancer. Therefore, these patients need to take additional precautions against the COVID-19 outbreak. This study aimed to examine factors associated with precautionary behavior among Israeli breast cancer patients during the COVID-19 pandemic.

Methods A cross-sectional study was conducted among 151 women with breast cancer. Participants completed measures of knowledge about COVID-19, perceived threat, sense of mastery, social support, precautionary behavior, and socio-demographic questionnaires. A multivariate regression model was calculated with precautionary behavior as the dependent variable.

Results The mean of precautionary behavior score was relatively high. Participants perceived their health as relatively good, had relatively high knowledge about COVID-19, and moderate perceived threat. Sense of mastery was relatively moderate and perceived social support was relatively high. In the multivariate regression analysis, after controlling for the background variables, knowledge about COVID-19 ($F(2,149) = 8.68$, $p < 0.001$; beta = 0.36) was significantly associated with precautionary behavior. This variable explained 15.4% of the precautionary behavior variance.

Conclusion Findings suggest that in order to enhance precautionary behavior among women with breast cancer during a pandemic outbreak, it is recommended to pay attention their knowledge about the virus.

Keywords COVID-19 · Knowledge about COVID-19 · Perceived threat · Precautionary behavior · Sense of mastery · Social support

Introduction

The global coronavirus disease 2019 (COVID-19) pandemic is challenging healthcare systems worldwide [1, 2]. Beginning in December 2019 in China, this virus has rapidly spread around the world [3], including Israel. The first Israeli person with COVID-19 was diagnosed on February 21, 2020, and since than thousands were diagnosed with this virus and, as of August 18, 2020, 692 people died from this virus. The battle against COVID-19 is still continuing in Israel.

The high transmission of the COVID-19 as well as lack of pharmaceutical treatments, posed serious challenges to control the virus spread [4]. To tackle this problem, health authorities stated that it is highly important to implement non-medical measures such as precautionary behaviors (e.g., washing hands often with soap and water or an alcohol-based hand sanitizer; avoiding shaking hands) [5]. To achieve the successful implementation of such measures recommended by the health authorities, the willingness of the public to follow the instructions plays an important role [6]. However, it is still a health problem to encourage the public to follow the recommended preventive actions.

Cumulative knowledge indicates that cancer patients, among them breast cancer patients, are more susceptible to COVID-19 than individuals without cancer. This is due to these patients' systemic immunosuppressive state, caused by the malignancy and anti-cancer treatments, such as

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chemotherapy or surgery [7, 8]. In addition, it was found that the COVID-19 mortality rate in breast cancer patients depends more on comorbidities than prior radiation therapy or current anti-cancer treatment [9]. Currently, breast cancer is the leading (30%) common cancer and the second (23%) cause of cancer death among women, which is considered as a top killer for women [10]. Therefore, these patients need to take additional precautions against the COVID-19 outbreak.

Overall, there are very limited data describing the effect of COVID-19 on patients with breast cancer. Most of these data is concentrated on diagnosis, treatment, and health services utilization during COVID-19 [11–13]. However, no study to date examined the factors associated with precautionary behavior among breast cancer patients during the COVID-19 outbreak. This was the aim of the current study.

This study is based on the cognitive model of coping with stressors [14], which proposes that health outcomes of coping with chronic and intense stressors are affected by appraisals of the stressor and coping resources (e.g., sense of mastery, social support). In this study, perceived stressors were conceptualized as *perceived threat*, as this factor may influence willingness and motivation to adopt health behaviors [15].

It should be noted that the Israeli Ministry of Health continues to release updated information for the lay public regarding how to behave in the COVID-19 routine (e.g., wearing a face mask when leaving home, practice hygiene, staying 2 m from other individuals, avoiding public spaces when having fever or respiratory symptoms). In a heuristic-systematic model [16], the assumption is that the relevance of such information is likely to motivate subjects in "risky and severe" condition to process risk information more systematically and to rely less on superficial cues regarding COVID-19. This is especially important for breast cancer patients as it was found that adherence to control measures is largely affected not only by risk perceptions but also by correct knowledge about COVID-19 [6].

As for coping resources (e.g., sense of mastery, an internal resource; social support, an external resource), these have consistently been found in the literature to be related to precautionary behavior [14, 17]. *Sense of mastery* refers to the perceived control of individuals over their future, their appreciation of cause-effect relationships, and their perceived ability to cope with life stressors [17]. *Social support* acts as a facilitator for setting coping strategies through sharing problems and getting helpful suggestions, which help people to face their problems and find constructive problem solving strategies [14].

To sum up, knowledge about the virus, perceived threat, and coping resources may play a significant role in precautionary behaviors. Therefore, we examine the associations between these factors and precautionary behavior among Israeli breast cancer patients during the COVID-19 outbreak. Our goal is to improve the collective understanding of breast cancer patients' response during the early stage of the pandemic,

COVID-19. This aim is especially important, given that precautionary behaviors are significant in both the spread and control of infectious diseases [18] and in maintaining the health of populations under a risk, such as breast cancer patients.

Materials and methods

Procedure

The study is a cross-sectional online survey. To minimize personal contact during the outbreak, the questionnaires were administered through the Qualtrics online platform. A total of 153 Israelis visited the online survey between April 5, 2020, and April 12, 2020. Inclusion criteria were persons who were diagnosed with breast cancer in the last 5 years, aged 18 +, and Hebrew speakers. Exclusion criteria were responses to the items in a similar pattern or not completing the questionnaire in its entirety ($n = 2$). Authorization for the study was obtained from REDACTED University's Ethics Committee (Authorization No. 032003).

Measures

Dependent variable

Precautionary behavior was measured with 4 items written by the authors following the precautionary guideline issued by the Israeli Ministry of Health [5]. The validity of the scale was reached by expert validity, a form of content validity. In this validity process, the scale was reviewed by a panel of four expert physicians in order to eliminate totally irrelevant items from the instrument and to re-phrase or supply new wording for items related to the measured construct where necessary. Participants were asked to indicate how often they perform various precautionary behavior on a five-point scale (from 1 = not at all to 5 = very often). A composite index of the average of all items was created, with a higher score indicates that participants display more precautionary behavior. Sample items include washing hands with soap and water or alcohol-based rub and avoiding close contact with people with symptoms such as coughing or sneezing. The internal consistency of the index was moderate (Cronbach's $\alpha = 0.70$).

Independent variables

Knowledge about COVID-19 was measured using a 6-item COVID-19 knowledge test assessing the symptoms, diagnosis, risk factors, ways of infection, ways to be protected from COVID-19, and knowledge regarding to where to refer a person who is suspected to have COVID-19. The validity of the scale was reached by expert validity (as detailed in the

precautionary behavior measure). Answers were rated on a 5-point Likert-type scale, ranging from 1 = do not know at all to 5 = know very much. A composite index of the average of all items was created, with a higher score indicating higher levels of knowledge about COVID-19. The internal consistency of the index was very good (Cronbach's α = 0.81).

Perceived threat was assessed based on a previous study conducted among the general public during the COVID-19 outbreak [6], using a one-item measure examining the extent to which the participant thinks he/she will contract the virus. "How likely do you think it is that you will contract COVID-19?" Answers were rated on a 5-point Likert-type scale, ranging from 1 = not at all likely to 5 = very likely.

Sense of mastery was assessed by a 7-item scale measuring the ability to deal with or exert control over issues as they arise in people's lives [19]. Participants were asked to indicate the extent to which they agreed or disagreed with each item on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree (e.g., "What happens to me in the future mostly depends on me"). The mean score was calculated; a high score indicated greater levels of sense of mastery (Cronbach's α = 0.81).

Social support was assessed by the Multidimensional Scale of Perceived Social Support [20], a 12-item scale. Participants were asked to indicate the extent to which they agreed or disagreed with each item on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree (e.g., "My family really tries to help me"). The mean score was calculated; a high score indicated greater levels of perceived social support (Cronbach's α = 0.94).

Socio-demographic variables included gender, age, years of education, marital status, number of children, home isolation since the outbreak of COVID-19 (yes/no).

Health information included perceived health status (bad/reasonable/good)—recoded into bad and reasonable = 0 vs good = 1 and time since diagnosis.

Statistical analyses

Data were analyzed using SPSS ver. 25. Descriptive statistics were used to describe the participants' demographic characteristics and the research variables. Pearson correlations were calculated to assess the associations between the research variables. Strength of correlation was as follows: 0–0.20 weak, 0.21–0.50 moderate, 0.51–0.80 good, 0.81–1-00 excellent. A multivariate regression was applied to assess the contribution of the study variables to the explained variance of precautionary behavior.

Results

As can be seen in Table 1, the study included 151 women with breast cancer. The mean age was about 51 years (range 23–86) and the average of education was approximately 15.4 years

(range 10–25). Most were married (64%) with a mean of two children. About half of the participants reported being in isolation since the COVID-19 outbreak. According to Table 2, the perceived health status of half of the participants was moderate, and 35% of the participants had other additional diseases. Among these other additional diseases were 41.4% hypertension, 17.1% diabetes, 15.7% coronary heart disease, and 25.7% other diseases.

As can be seen in Table 3, the mean of precautionary behavior score was 4.54 (SD = 0.39), in a range of 1–5, meaning that precautionary behavior score was relatively high. The mean scores of perceived health status and knowledge about COVID-19 were also relatively high, yet means for perceived threat and sense of mastery were moderate. Perceived social support was relatively high. In other words, participants in the current study perceived their health status as relatively good, had relatively high knowledge about COVID-19, and believed that there is a moderate probability that they would become ill from COVID-19. Sense of mastery was relatively moderate and participants believed that they have a relatively high social support.

According to Table 4, the mean score for perceived health status was moderate, while the mean score for knowledge about COVID-19 was relatively high. The mean score for perceived threat was moderate, for sense of mastery was relatively low, while for social support the mean score was relatively high. In addition, as can be seen in Table 4, positive significant associations were found between knowledge about COVID-19 and precautionary behavior (p = 0.36, p < 0.01), sense of mastery and precautionary behavior (p = 0.21, p < 0.05), and social support and precautionary behavior (p = 0.24, p < 0.05) meaning that the more participants had knowledge about COVID-19 and the more they believed they have sense of mastery and social support, the more they have taken precautionary behavior. In addition, higher perceived health status was significantly associated with lower perceived threat (p = − 0.28, p < 0.01), lower sense of mastery (p = −

Table 1 Participants' demographic characteristics (n = 151)

Socio-demographic characteristics	
Mean age (SD), range	51 (11.35), 23–86
Mean number of years of education (SD), range	15.42 (2.97), 10–25
Marital status (%)	
Married	98 (65.3)
Single	53 (34.7)
Mean number of children (SD), range	2.46 (1.48), 0–12
Home isolation since the outbreak of COVID-19 (%)	
Yes	76 (50.7)
No	74 (49.3)

Table 2 Participants' health characteristics ($n = 151$)

Health characteristics	
Perceived health status (%)	
Bad	17 (11.0)
Moderate	73 (49.3)
Good	59 (39.7)
Other chronic disease (%)	
Yes	54 (64.6)
No	97 (35.4)
Types of other chronic diseases (%)	
Hypertension	21 (14.3)
Diabetes	6 (4.1)
Coronary heart disease	3 (2.0)
Other	24 (79.6)

0.17, $p < 0.05$), and higher perceived social support ($p = 0.22$, $p < 0.01$). Positive significant associations were found between knowledge about COVID-19 and sense of mastery ($p = 0.20$, $p < 0.05$) and between knowledge about COVID-19 and social support ($p = 0.17$, $p < 0.05$).

The correlation between age and precautionary behavior was significant ($r = -0.17$, $p < 0.05$). No significant associations were found between number of children and precautionary behavior ($r = -0.15$, $p = 0.07$) and between years of education and precautionary behavior ($r = 0.14$; $p = 0.09$). In addition, no significant differences were found in precautionary behavior between married participants (M = 4.68, SD = 0.36) than non-married ones (M = 4.60, SD = 0.43) ($t(145) = 1.13$, $p = 0.25$). Thus, analyses were calculated while controlling for age.

Following the bivariate analysis, a multivariate regression analysis was conducted for identifying precautionary behavior correlates. Only variables found to be significantly associated with precautionary behavior in the bivariate analysis were included in the equation (knowledge about COVID-19, sense of mastery, social support). After controlling for the background variables, only knowledge about COVID-19 ($F(2,149) = 8.68$, $p < 0.001$; beta = 0.36) emerged as a

significant predictor of precautionary behavior. This variable explained 15.4% of the precautionary behavior variance.

Discussion

Our results suggest that higher percentages of breast cancer patients perform precautionary measures to reduce their risk of acquiring COVID-19. Approximately 95% of respondents said that they would avoid close contact with people with symptoms such as coughing or sneezing. Similar percentages stated that they wash hands often with soap and water or an alcohol-based hand sanitizer and that they cover their mouth and nose when coughing or sneezing. These reported actions are in agreement with those reported in similar studies and recorded behavior in the face of an epidemic [18, 21]. For example, a study conducted among 4607 citizens in China during the COVID-19 has found that participants actively engaged in precautionary behaviors [21]. The high levels of precautionary measures found in the current study could be due to two main reasons. First, they may be related to the measures the Israeli health authorities have adopted since the outbreak in controlling the transmission of the COVID-19, including issuing precautionary guidance on a daily basis. Such strong measures and the transparency of the media may increase the public's mental resources to maintain their physical health [21]. Second, cancer patients, and among them breast cancer patients, are at increased risk of contracting the virus [7, 8]. Therefore, it might be that breast cancer patients have taken precaution in implementing the recommendations of the health authorities and did their best to adhere to the various guidelines. These findings are valuable because knowledge of what breast cancer patients are likely to perform during a pandemic outbreak can be used to estimate the health effects of the virus.

The multivariate analysis provides some useful insights. Knowledge about COVID-19 has emerged as an important determinant of precautionary actions. This finding is highly important given that insufficient knowledge about a virus can

Table 3 COVID-19 precautionary behavior ($n = 151$)

To what extent are you performing the following actions?	Number (%)		
	Level 1	Level 2	Level 3
Wash hands often with soap and water or an alcohol-based hand sanitizer	4 (2.1)	14 (8.2)	133 (89.8)
Avoid shaking hands	–	2 (0.7)	149 (99.3)
Cover mouth and nose when coughing sneezing	2 (0.7)	8 (4.1)	140 (95.2)
Avoid close contact with people with symptoms such as coughing or sneezing	2 (0.7)	6 (3.4)	143 (95.9)
Keep a distance of 2 m from those around you outside your home	–	7 (4.8)	144 (95.2)

Level 1, low to medium extent; level 2, moderate extent; level 3, high to very high extent

Table 4 Correlates, means, SDs, and ranges of study variables (*n* = 151)

Variables	1	2	3	4	5	6
1. Precautionary behavior	–					
2. Perceived health status	0.10	–				
3. Knowledge about COVID-19	*0.36***	− 0.03	–			
4. Perceived threat	0.03	− *0.28***	0.07	–		
5. Sense of mastery	*0.21**	− *0.17**	*0.20**	0.05	–	
6. Social support	*0.24**	*0.22***	*0.17**	− 0.13	− 0.13	–
Mean	4.54	0.43	4.19	2.48	2.04	3.44
SD	0.39	0.50	0.59	0.92	0.67	0.69
Possible range	1–5	0–1	1–5	1–5	1–5	1–5
Actual range	1–5	0–1	2.67–5	1–5	1–4	1–5

*$p < 0.05$; **$p < 0.01$

lead to a higher risk of contracting the virus, as occurred during the SARS outbreak [22]. It should be noted that during the outbreak of COVID-19, all types of Israeli media were used aiming to provide comprehensive and current information about the infection trends worldwide and in Israel. These various veins of access to information may serve as triggers for preventive behaviors [6]. This strategy of spreading information regarding the virus may explain the association we found between knowledge about COVID-19 and precautionary behavior. The finding that knowledge about COVID-19 is an important determinant of precautionary actions is significant for those who develop public health messages during crisis situations. Accordingly, health authorities should identify vulnerable populations that may not be literate and target health promotion messages in appropriate methods, which may have a high probability of reaching these populations [22].

Our measure of risk threat was not associated with precautionary actions and the measures of coping resources did not indicate any statistically significant associations with precautionary behaviors. A past study conducted in the Netherlands revealed that higher risk perception was associated with more precautionary behaviors for SARS; however, when additional explanatory variables such as gender, age, and education were included, no significant association between risk perception and precautionary actions was observed [23]. If risk perception has little effect on precautionary behavior, public health messages aimed at changing risk perceptions might be non-effective in changing behavior [24]. Nevertheless, the implication seems to be that motivating breast cancer patients to practice protective behavior works best by increasing their knowledge, rather than by exaggerating risk perceptions. However, clearly, this area needs further empirical examination.

This study has limitations. First, we used a correlational design, thereby limiting our capacity to demonstrate causal relationships. Second, this is a cross-sectional study; therefore, causal interpretations cannot be made. Third, we have no information if participants received additional information or education regarding precautionary behavior from oncology institutions or health care providers. Nevertheless, given the mass media in Israel, we assume that the amount of information these women received was mostly reliant on information provided specifically by Israel's Ministry of Health, which limits the study's generalizability of the findings. Finally, only knowledge about COVID-19 explained the variance of the dependent variable, precautionary behavior. This indicates the need to include additional variables in future studies, in an attempt to better explain the complexity of precautionary behavior among breast cancer patients during a pandemic crisis.

Conclusions

In order to enhance precautionary behavior among breast cancer patients during a virus outbreak, it is recommended to pay close attention to their knowledge about the virus. Evidently, being actively engaged in news information processing and being informed about the COVID-19 pandemic plays a pertinent role in driving breast cancer patients to engage in precautionary behaviors. In addition, it is possible that the relation between knowledge and behavior in our study may be stronger if we had used variables that explore the same specific issue (e.g., knowledge of the benefits of wearing a face mask and behavioral intention of wearing a face mask). Therefore, it is suggested for future studies to explore the associations between specific knowledge and specific behavior [25]. Finally, given that the study was conducted in April, a relatively early period in the global pandemic timeline, it is suggested that future studies will revisit these participants in another point of time to examine if precautionary behaviors remained high across time.

Authors' contributions Both authors recruited the participants and collected the data. SSA extracted and analyzed the data and wrote the paper. IL revised the manuscript. Both authors read and approved the final manuscript.

Data availability The data that support the findings of this study are available from the authors upon reasonable request.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethics approval and consent to participate Ethics approval was received from the Ethics Committee of the Bar-Ilan University (approval No. 032003). Our survey's introductory page stated explicitly that proceeding to the questionnaire would signify consent to participate.

Consent for publication Not applicable.

Code availability Not applicable.

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