RESEARCH ARTICLE

Impact of Perceived Cancer Risk on the Cancer Screening Rate in the General Korean Population: Results from the Korean Health Panel Survey Data

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Abstract

Objective: To investigate the relationship between the perception of cancer risk and likelihood of having undergone cancer screening. Materials and Methods: We used data from the Korean Health Panel Survey from December 2011 onward. Of 3,390 patients who visited a hospital during the previous year, we included data from 2,466 individuals; 924 samples were excluded due to missing data. Logistic regression analysis and the chi square test were used to investigate the association between perceived cancer risk and the likelihood of having undergone cancer screening. Results: For patients who perceived their risk of developing cancer during the next 10 years to be 30-40%, the odds ratio was increased 1.65 fold (95%CI: 1.223, 2.234) compared with those who perceived their risk to be almost zero. Although the difference was not statistically significant, perceiving cancer risk as either extremely low or extremely high appears to be associated with a reduced likelihood of having undergone cancer screening, resulting in an inverted U-shaped relationship. Conclusions: Physicians and researchers should be aware of the importance of the affective component of risk perception. Policies addressing the influence of cancer risk perception should be implemented in South Korea and worldwide.

Keywords: Cancer screening - perception of cancer risk - South Korea

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Introduction

In South Korea, cancer is the leading cause of death. In 2009, 69,780 cancer deaths were reported, accounting for 28% of all deaths. The cancer incidence rate increased by an average of 3.3% (1.6% in males, 5.3% in females) between 1999 and 2009. Several epidemiological studies have suggested that the risk of cancer is associated with adherence to a Western lifestyle (Zhang et al., 2012). Cancer is the major contributor to the national burden of disease, resulting in more deaths than cardiac disorders and cerebrovascular diseases (the second and third most frequent causes of death, respectively) combined. (Jung et al., 2014)

Cancer is a source of anxiety for many people. Perception of risk, defined as an individual's assessment of the likelihood or probability of harm, is considered a crucial factor in promoting precautionary health behavior, and is an essential component of various theoretical models of health behavior, including Protection Motivation Theory (PMT). (Armitage and Conner, 2001) For example, individuals perceiving themselves to be at greater risk of developing breast cancer are more likely to undertake cancer screening and to be involved in cancer risk-reducing activities. (Katapodi et al., 2004) However, whether an individual's perception of her risk of cervical cancer influences the likelihood that she will undergo screening for the disease has not yet been established.

Several empirical studies have proposed a variety of factors, in addition to those specified by PMT, that might be involved in precautionary health behavior. These include the influence of family members and physicians (Abotchie and Shokar, 2009); the nature of previous healthcare experiences (Abotchie and Shokar, 2009); cognitive closure (Eiser and Cole, 2002); holding a "fatalistic" perspective, and the extent to which the idea of cervical screening is normalized (Goldman and Risica, 2004); normative beliefs (i.e., concern about what others may think) (Abotchie and Shokar, 2009); contextual factors such as provision of screening as part of general health check-ups (Lee et al., 2002); and religious preferences (Merrill and Madanat, 2002) and perceived personal, moral obligations. (Orbell, 1996)

Although the variables specified in PMT and the Heath Belief Model have received considerable empirical support (Ben-Natan and Adir, 2009), various controversies and criticisms have been highlighted by several theoretical and empirical studies.

Knowledge, attitude, and risk perception affect the likelihood of engaging in desirable health behaviors. In

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this context, cancer screening rates have been studied in the general population, with results showing that improved knowledge (Sung et al., 1997), a positive attitude (Cullati et al., 2009), and perceived susceptibility are all positively associated with the likelihood of undergoing cancer screening.

The present study evaluated the relationship between perception of cancer risk and the likelihood of having undergone cancer screening.

Materials and Methods

Study sample and design

We used data from the Korean Health Panel Survey (KHPS) from December 2011 onward, which provide detailed information pertaining to families and individuals drawn from a nationally representative sample of households. The initial 2008 baseline data of the KHPS included 21,283 individuals from 7,009 households. The total number of individuals and households in 2009, 2010, and 2011 were 19,154 and 6,314, 17,878 and 5,956, and 17,037 and 5,741, respectively. However, for our analysis, we only used the 2011 survey data due to a lack of information on perception of cancer risk during the other years. From a total of 3390 patients who visited the hospital during the previous year, we included data from 2,466 individuals and excluded 924 samples due to missing data. Korean Health Panel Survey data is a National public database (website: http://www.khp.re.kr).

Independent variables

Perception of cancer risk was indicated by responses to the question, "How do you assess your cancer risk over the next 10 years?" Response options included almost zero, 10-20%, 30-40%, 50-60%, and >70%.

Control variables

Patients were categorized according to age group (≤29,

Table 1. General Characteristics of Study Variables

		Total			Cancer screening						P-value
					Yes			No			
		N	%	%*	N	%	%*	N	%	%*	
Perceived cancer risk possibility following 10 year (%)	Almost does not take	1,069	43.4	41.9	289	27.0	28.7	780	73.0	71.4	0.003
	10-20	666	27.0	27.9	203	30.5	31.8	463	69.5	68.2	
	30-40	284	11.5	11.8	101	35.6	40.5	183	64.4	59.5	
	50-60	310	12.6	13.1	93	30.0	31.8	217	70.0	68.2	
	≥ 70	137	5.6	5.3	34	24.8	25.6	103	75.2	74.5	
Gender	Male	1,095	44.4	55.4	330	24.1	25.6	1,041	75.9	74.4	<.0001
	Female	1,371	55.6	44.7	390	35.6	38.1	705	64.4	61.9	
Age	≤ 29	66	2.7	3.8	53	80.3	78.5	13	19.7	21.5	
	30-49	823	33.4	37.7	350	42.5	41.9	473	57.5	58.1	<.0001
	≥ 50	1,577	64.0	58.5	317	20.1	21.2	1,260	79.9	78.8	
Residential region	Urban	1,135	46.0	48.5	353	31.1	32.9	782	68.9	67.1	0.089
	Rural	1,331	54.0	51.6	367	27.6	29.6	964	72.4	70.4	
Education	≤ Middle school	1,030	41.8	36.5	200	19.4	21.2	830	80.6	78.8	<.0001
	High school	782	31.7	33.7	252	32.2	32.9	530	67.8	67.2	
	≥ College	654	26.5	29.8	268	41.0	41.5	386	59.0	58.5	
Marital status	Married	438	17.8	18.0	141	32.2	37.9	297	67.8	62.1	0.001
	Single	2,028	82.2	82.0	579	28.6	29.7	1,449	71.5	70.3	
Household Income	Low	820	33.3	27.2	156	19.0	21.1	664	81.0	78.9	<.0001
	Middle	828	33.6	34.9	284	34.3	36.2	544	65.7	63.9	
	High	818	33.2	37.9	280	34.2	33.8	538	65.8	66.2	
Economic activity status	No	940	38.1	36.3	242	25.7	28.1	698	74.3	71.9	0.017
	Yes	1,526	61.9	63.7	478	31.3	32.9	1,048	68.7	67.1	
Smoking status	Smoker	441	17.9	18.7	185	42.0	44.1	256	58.1	55.9	<.0001
	Former smoker	476	19.3	18.5	127	26.7	28.6	349	73.3	71.5	
	Never	1,549	62.8	62.8	408	26.3	28.1	1,141	73.7	71.9	
Alcohol use	1 times a month	729	29.6	30.2	242	33.2	35.3	487	66.8	64.7	0.000
	2-3 times a week	283	11.5	11.5	101	35.7	37.5	182	64.3	62.5	
	1 times or more a week	874	35.4	36.1	217	24.8	26.6	657	75.2	73.5	
	Nothing	580	23.5	22.1	160	27.6	29.9	420	72.4	70.2	
Exercise	Every day	155	6.3	5.7	38	24.5	27.2	117	75.5	72.8	0.154
	5-6 times a week	284	11.5	12.0	90	31.7	31.8	194	68.3	68.2	
	3-4 times a week	306	12.4	13.0	74	24.2	26.3	232	75.8	73.7	
	1-2 times a week	311	12.6	14.1	102	32.8	34.9	209	67.2	65.1	
	Nothing	1,410	57.2	55.3	416	29.5	31.7	994	70.5	68.3	
Depressive symptom	Yes	218	8.8	8.3	68	31.2	32.4	150	68.8	67.6	0.713
	No	2,248	91.2	91.7	652	29.0	31.1	1,596	71.0	68.9	
Number of chronic disease	No	864	35.0	38.9	377	43.6	43.8	487	56.4	56.2	<.0001
	Yes	1,602	65.0	61.1	343	21.4	23.2	1,259	78.6	76.8	
Total		2,466	100.0	100.0	720	29.2	31.2	1,746	70.8	68.8	

30-39, or ≥50 years of age), residential region (urban or rural), education status (middle school or less, high school, and college or more), and household income (low, medium, and high). Employment status, smoking status, alcohol use, exercise, depressive symptoms, and chronic disease were included as covariates.

Dependent variables

The dependent variable, cancer screening during the previous year, was indexed by the question, "Have you ever been screened for cancer?" Responses were categorized as "yes" or "no."

Table 2. Adjusted Effect between Perceived Cancer Risk and Cancer Screening

	Cancer screening		
	OR	95%CI	
Perceived cancer risk possibility following 10 year (%)			
Almost does not take	1.000		
10-20	1.016	0.802	1.285
30-40	1.653	1.223	2.234
50-60	1.128	0.835	1.525
≥ 70	0.952	0.600	1.510
Gender			
Male	1.000		
Female	0.517	0.378	0.709
Age			
≤ 29	10.033	5.348	18.824
30-49	2.112	1.659	2.689
≥ 50	1.000		
Residential region			
Urban	1.000		
Rural	1.264	1.040	1.535
Education			
≤ Middle school	1.000		
High school	0.971	0.716	1.317
≥ College	1.048	0.821	1.338
Marital status			
Married	1.000		
Single	1.122	0.841	1.496
Household Income			
Low	1.000		
Middle	0.877	0.648	1.187
High	1.234	0.984	1.547
Economic activity status			
No	1.000		
Yes	1.120	0.893	1.404
Smoking status			
Smoker	1.000		
Former smoker	1.175	0.840	1.645
Never	0.754	0.532	1.069
Alcohol use			
1 times a month	1.000		
2-3 times a week	0.738	0.542	1.003
1 times or more a week	0.791	0.553	1.131
Nothing	0.668	0.510	0.875
Exercise			
Every day	1.000		
5-6 times a week	0.894	0.582	1.372
3-4 times a week	0.875	0.646	1.184
1-2 times a week	0.642	0.471	0.875
Nothing	0.797	0.596	1.065
Depressive symptom			
Yes	1.000		
No	1.402	0.996	1.974
Number of chronic disease			
No	1.000		
Yes	1.842	1.502	2.259

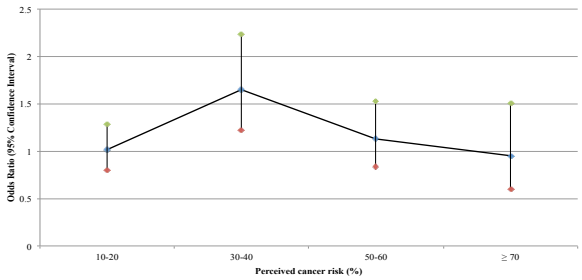

Figure 1. Perceived Cancer Risk over the Next Ten Years

Analytical approach and statistics

Logistic regression and the chi square test were used to investigate associations between perceived cancer risk and cancer screening rates. For all analyses, a value of $p < 0.05$ was taken to indicate statistical significance (two tailed). All analyses were conducted using the SAS statistical software package (ver. 9.2., SAS Institute, Inc., Cary, NC, USA).

Results

Table 1 lists the covariates included at baseline, in addition to the variables of interest. Data from 2,466 patients were included; cancer screening had been completed by 41.9% of the patients who perceived their risk of developing cancer over the next 10 years to be almost zero, and by 5.3% of those who rated their risk of cancer at ≥70% (Table 1). Data are also shown graphically in Figure 1. Table 2 shows the adjusted effect of perception of cancer risk on rates of cancer screening. For those who perceived their cancer risk during the next 10 years to be 30-40%, the odds ratio was increased 1.65 fold (95%CI: 1.223, 2.234) compared with those who rated their risk as almost zero.

Discussion

The primary purpose of this study was to investigate the association between perception of cancer risk and the cancer screening rate among the general adult population of South Korea.

This relationship was observed to be independent of sociodemographic variables (i.e., age, gender, residential region, education status, marital status, and household income), health risk behavior variables (i.e., exercise, smoking status, and alcohol consumption), health status (i.e., depressive symptoms and chronic disease), and the year in which the data were collected.

Perception of cancer risk is theoretically and empirically relevant to both the degree of motivation to undergo cancer screening and the likelihood of engaging in risk-reducing behaviors. (Rogers and Mewborn, 1976) Kreuter (Kreuter, 1999) concluded that individuals who underestimate their risk of developing cancer may be less likely to engage in health-protective behaviors, whereas those who overestimate their risk may worry excessively,

engage in extensive protective behaviors, and burden the health care system.

Cancer risk perception is also associated with quality of life and psychological wellbeing (van Dooren et al., 2004). Furthermore, the use of educational tools aiming to address perceptions of cancer risk is becoming increasingly common. For example, Waters et al. (2010) reported that high perceived cancer risk was associated with reduced mental and physical health, and Kinsinger et al. (2009) observed that perceived risk of breast cancer was positively associated with depression and anxiety.

African-Americans are more likely to rate their cancer risk as being lower than average and their absolute cancer risk as lower compared with whites (Orom et al. 2010, 2013). However, epidemiological evidence indicates that African-Americans are frequently at greater risk (Siegel et al., 2013) of developing cancer compared with non-Hispanic whites.

The lowest perceived risk of cancer was found among Asian females in the context of a breast cancer prevention study. (Haas et al., 2005) Although clinicians emphasize the average risk among all females, Asian-Americans have consistently lower rates of cancer screening, which is not explained by insurance status. Hispanic females, who tend to have the lowest rate of insurance coverage of any ethnic group, may be more likely to be screened due to a higher perceived risk; accordingly, their screening rates for cervical and breast cancers are similar to those of whites. (Abraido-Lanza et al., 2004)

Females who perceive their risk of breast cancer to be higher frequently exhibit greater psychological distress, both in the context of breast cancer specifically and in general. (Kash et al., 1995) Hopwood et al. (2001) observed a greater degree of concern regarding cancer in risk overestimators vs. both underestimators and individuals who accurately appraised their risk. Meiser and colleagues (2000) reported that overestimators had higher state anxiety as well as higher breast cancer-specific anxiety. In the present study, in contrast to previous studies, extremely low or extremely high perceived cancer risk was associated with a reduced likelihood of having undergone screening, resulting in an inverted U-shaped function. However, this result was not significant. It should be noted that scial network is important in the Korean context (Lee et al., 2013).

There are a number of strengths and limitations to this study. Strength is that the participants in the survey may be representative of the overall population and the study obtained a large sample size of population, so that the results can be generalized to the adult South Korean population.

Nevertheless, we do acknowledge a possible sample bias. First, we could not fully exclude the effects of information bias because the measurement of all variables included in this study was based on a self-reported questionnaire survey. Second, there may be residual or uncontrolled confounders that influence the associations suggesting that these unknown confounders might be related to our study results. Finally, causal inferences cannot be drawn from this study result using a cross-sectional study design. Thus, the results possibly reflect reverse causality and bidirectional relations when assessing the association between perceived cancer risk and cancer screening. Therefore, longitudinal studies with validated measures of cancer screening are required to replicate our findings and to clarify the causality and mechanisms. Future studies should also refine our understanding of how specific perceived cancer risk contribute to cancer screening and behaviors.

In conclusion, physicians and researchers should be aware of the importance of the affective component of risk perception. Policies addressing the influence of cancer risk perception should be implemented in South Korea and worldwide in the context of primary cancer prevention. For example, the importance of following a healthy life¬style should be emphasized. Furthermore, interventions aiming to reduce distress in individuals perceiving their cancer risk as high should be developed.

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