

RESEARCH ARTICLE

Associations between Quality of Life and Marital Status in Cancer Patients and Survivors

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Abstract

Background: The cancer survival rate in Korea has substantially increased, necessitating the management of not only patients with cancer but also longer term survivors. Although the divorce rate has drastically increased in Korea, there is not sufficient research regarding the relationship between changes in marital status and quality of life (QOL) in cancer patients and survivors. Thus, we aimed to examine the relationship between marital status and QOL in such cases. **Materials and Methods:** This study was performed using the Community Health Survey of 2008 administered by the Korea Centers for Disease Control and Prevention (N=169,328). We used t-tests and Chi-square tests to compare demographic variables between men and women, and analysis of variance (ANOVA) to compare QOL scores among comparison groups. We also performed a multilevel analysis on the relationship between QOL and marital status while accounting for provincial differences. **Results:** Decline of EuroQOL five dimensions (EQ-5D) in single patients with cancer was greater than in any other marital status group, but there was no statistically significant decline in survivors of cancer with regard to marital status. In the general population, the decline of EQ-5D was higher among single people than married people. Using the EuroQOL visual analog scale (EQ-VAS), single people had higher values than those of other marital status among both patients with cancer and survivors of cancer. In the general population, EQ-VAS values were higher for single people compared to married people. **Conclusions:** There may be a significant relationship between marital status and QOL in cancer patients and survivors. Policy interventions to manage patients with cancer who experience a decline in QOL as well as marital problems should be conducted.

Keywords: Cancer - EQ-VAS - EQ-5D - marital status - quality of life

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Introduction

Cancer is characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue. General risk factors for cancer include age, lifestyle, family history, health condition, and environment. Although risk factors such as tobacco use, being overweight, and excessive sun exposure can be avoided, other risk factors cannot be controlled, such as aging (Ames et al., 1995).

According to the 2011 annual report of cancer statistics in Korea, the age-standardized incidence of cancer increased from 219.0 per 100,000 people in 1999 to 319.8 in 2011, a rapid increase compared to other countries. However, cancer survival rates in Korea increased substantially compared to other countries (44.0% in 1996-2000, 66.3% in 2007-2011) (Korea Central Cancer Registry, 2011). Thus, the importance of management for survivors of cancer as well as patients with cancer has

gradually increased.

In many previous studies, quality of life (QOL) analyses were conducted in patients with cancer. These studies found that the QOL of patients with cancer was affected by treatment, socioeconomic status, demographic status, social support, family support, and spousal role, among others (Dorval et al., 1998; Parker et al., 2003; Chen et al., 2004; Tahmasebi et al., 2007; Pourhoseingholi et al., 2008; Sanda et al., 2008; Ashing-Giwa and Lim, 2009; Ainuddin et al., 2012; Hung et al., 2013; Ezat et al., 2014). In this study, we focused on the marital status of cancer patients.

Marital status is classified as single, marriage problems (including separation, divorce, and bereavement), and married. According to the 2008 Organization for Economic Cooperation and Development (OECD) Family Database, the divorce rate in Korea is high relative to other OECD countries (Korea: 2.6/7, OECD average: 2.1/7), and has increased rapidly from 1970 to 2008 (change

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from 1970 to 2008: 2.2/4 total points) (Organization for Economic Cooperation and Development, 2012). Moreover, according to the Population Trends Survey of the Korean National Statistical Office in 2000-2012, the divorce rate for men over 40 years of age increased from 46.5% in 2000 to 70.5% in 2012, and the divorce rate for women increased from 54.2% to 74.5%, indicating that trends in divorce rates are changing (Statistics Korea, 2000-2012). According to the Population and Housing Census Department of Statistics Korea, the percentage of single men and women aged 25-39 years rose from 30.0% and 13.2% in 1995 to 52.8% and 35.6% in 2010, respectively (Statistics Korea, 1995, 2000, 2005, 2012). Thus, given that the trends in marital status among Koreans are changing rapidly, a study on whether sudden changes in marital status influence the QOL of patients with cancer is needed.

Although previous studies were conducted regarding QOL related to marital status or cancer, they focused on topics such as the social role of the spouse in mental health, the impact of marital status in preventing certain diseases, and the QOL in patients with specific cancer (Cassileth et al., 1992; Cotten, 1999; Bottomley, 2002; Williams, 2003; Inaba, 2005; Bierman, 2009; Wang, 2011; 2013; Tabolli, 2012; Caputo, 2013). However, research regarding the impact of rapid changes in marital status and the relationship between marital status and QOL in patients with cancer is lacking. Thus, in this study, we analyzed the differences in QOL by marital status in patients with cancer and survivors of cancer.

Materials and Methods

Study population

The data used in this study were from the Community Health Survey administered by the Korea Centers for Disease Control and Prevention, which was designed to facilitate inter-provincial comparisons (Korea Centers for Disease Control and Prevention, 2008-2010). The Community Health Survey was administered by investigators who conducted one-on-one visits and interviews targeting adults 19 years of age or older in 253 health centers nationwide starting in 2008. The final analysis used data from 169,328 people from a total of 200,800, excluding 31,472 people for whom information on QOL and/or marital status by presence of current cancer was incomplete and therefore could not be analyzed. As the Community Health Survey data is secondary data that does not contain private information and is available in the public domain, our study did not need to address ethical concerns. The protocol of the Community Health Survey was reviewed and approved by the institutional review board of the Korea Centers for Disease Control and Prevention (2010-02-CON-22-P).

Variables

The outcome variables were EuroQOL visual analog scale (EQ-VAS) and EuroQOL five dimensions (EQ-5D) Index scores. EQ-VAS is a self-rated health questionnaire presented as a vertical visual analog scale, where the endpoints are labeled “best imaginable health

state” and “worst imaginable health state.” Participants completed the scale ranging from 0 to 100 on the study day. Responses to this scale were used as a quantitative measure of participants’ self-rated health. The EQ-5D is an index of five dimensions of health-related QOL. The five dimensions are mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The original EQ-5D Index has values ranging from 0 to 1. In order to compare the two indicators (EQ-VAS and EQ-5D), the EQ-5D Index was multiplied by 100 before the data were analyzed.

The variable of major interest in its association with the outcome variables was marital status. Marital status was divided into single, marriage problems (separation, divorce, bereavement), and married. In addition, other independent variables considered in the analysis were presence of current cancer, frequent depression for more than 2 weeks, awareness of stress, age, family income, education level, perceived health status, and survey year. Awareness of stress was defined as “a lot” or “very much” as descriptive of stress in one’s daily life, age was classified into 10-years intervals, family income was classified into four groups, education levels were classified as “less than high school”, “high school education”, and “college graduate”, and subjective health status was defined as describing one’s subjective health level as “good” or “bad”.

Statistical analysis

In order to analyze the relationship between QOL and marital status by the presence of current cancer, the following variables were adjusted: frequent depression for more than 2 weeks, awareness of stress, age, family income, education level, and perceived health status.

We first examined the distribution of each variable to analyze the general characteristics by presence of current cancer, and we performed χ^2 tests to examine differences in each variable according to presence of current cancer. Next, to compare the average values on the QOL indices according to the independent variables, we performed analyses of variance (ANOVAs). Finally, to analyze the relationship between QOL and marital status by presence of current cancer, considering the characteristics of the Community Health Survey, we performed a multilevel analysis. All analyses were performed using SAS software (ver. 9.2). p values <0.05 were considered statistically significant.

Results

Of the 169,328 participants in the final sample, 1,526 were patients with cancer and 1,796 were survivors of cancer. The overall ANOVA revealed that the average EQ-5D was higher for the general population than those of other groups. The QOL measured by the EQ-5D Index was higher in the order single > married > marriage problems in each group. EQ-5D Index values were higher for those that did not report frequent depression for more than 2 weeks and for those who had an awareness of stress for all groups.

The average EQ-VAS was higher for the general

Table 1. Relationships of Quality of Life with Demographic Characteristics and Health Behaviors [mean (SD) and p values*]

	Patients			Survivors			General population										
	EQ-5D ^a	EQ-VAS ^b	EQ-5D	EQ-5D	EQ-VAS	EQ-5D	EQ-5D	EQ-VAS									
Marital status																	
Single	84.08	54.17	23.9	0.0963	91.06	14.43	0.7119	70.63	19.64	0.9246	97.71	8.63	<0.0001	79.99	14.4	<0.0001	
Separation/Divorce/Bereavement	77.76	56.15	21.9		85.85	15.64		62.83	17.8		88.71	15.82		67.52	18.44		
Married	82.78	59.37	21.34		90.13	15.07		66.93	19.23		94.99	11.65		74.44	16.12		
Frequent depression for more than 2 weeks																	
Yes	66.95	46.65	22.93	<0.0001	78.29	21.82	<0.0001	55	22.17	<0.0001	83.52	21.7	<0.0001	61.94	20.79	<0.0001	
No	86.82	62.58	19.52		90.62	13.54		67.53	18.02		95.42	10.48		75.27	15.7		
Awareness of stress																	
Yes	72.25	49.7	22.26	<0.0001	83.4	19.79	<0.0001	58.14	20.75	<0.0001	91.17	16.48	<0.0001	68.77	18.66	<0.0001	
No	87.86	64.18	19.11		91.4	12.44		69.13	17.32		95.63	10.04		76.17	15.29		
Sex																	
Male	81.02	57.64	22.27	0.4564	90.58	15.42	0.0026	66.96	19.67	0.8276	95.73	11.55	<0.0001	76.14	15.83	<0.0001	
Female	82.56	59.47	20.8		88.27	15.16		65.46	18.55		93.25	12.82		72.4	17.08		
Age (years)																	
20-29	87.62	54.14	21.28	0.0152	94.76	11.49	<0.0001	74.75	15.12	0.0014	98.8	5.2	<0.0001	81.13	13.18	<0.0001	
30-39	90.15	58.35	21.97		95.69	7.31		72.46	15.42		98.32	5.8		78.3	13.84		
40-49	88.21	59.85	21.79		95.67	9.39		73.6	15.68		97.32	7.72		77.21	14.4		
50-59	85.39	62.64	20.32		92.55	12		68.5	19.14		95.11	10.65		74.19	15.88		
60-69	81.5	66.72	17.51		88.6	15.17		64.72	18.28		90.13	15.29		68.79	17.62		
70-79	73.75	54	21.19		83.69	18.1		61.58	19.93		83.65	19.09		62.7	18.91		
Family income (thousand won)																	
≤12,000	77.94	54.12	21.85	<0.0001	85.27	16.9	0.0009	61.45	19.91	0.0003	88.73	16.68	<0.0001	67.26	18.73	<0.0001	
12,000-24,000	83.39	61.59	20.74		91.82	12.8		68.12	17.45		95.78	10.43		75.45	15.6		
24,000-42,000	86.69	62.98	19.43		93.28	13.16		71.35	16.42		97.4	7.64		77.67	14.05		
>42,000	90.44	67.8	19.73		94.6	10.39		73.81	15.87		97.75	7.11		78.82	13.68		
Education level																	
Less than high school	79.26	56.34	21.67	<0.0001	87.11	15.87	0.4094	63.23	19.12	0.0035	89.51	15.97	<0.0001	68.09	18.09	<0.0001	
High school graduate	86.58	62.03	20.82		92.6	14.18		70.18	18.38		97.3	8.16		77.51	14.59		
College graduate	86.98	64.78	20.45		95.25	10.16		75.59	14.37		98.51	5.42		79.5	13.18		
Perceived health status																	
Good	96.07	78.11	13.27	<0.0001	96.81	6.43	<0.0001	79.97	14.63	<0.0001	98.73	4.63	<0.0001	82.39	11.67	<0.0001	
Bad	80.81	57.22	21.39		87.8	16		63.57	18.61		91.17	14.98		67.96	17.08		
Total	81.78	58.54	21.57	<0.0001	89.16	15.3	<0.0001	66.04	19	<0.0001	94.41	12.31	<0.0001	74.14	16.61	<0.0001	

*p values for results by analysis of variance (ANOVA); ^aEQ-5D, EuroQOL five dimensions; ^bEQ-VAS, EuroQOL visual analog scale

population than others and was higher in the order single > married > marriage problems for survivors of cancer and the general population. However, the EQ-VAS values were higher in the order married > marriage problems > single for patients with cancer. In the categories of frequent depression for more than 2 weeks and awareness of stress, results were similar to that of EQ-5D (Table 1).

In multilevel analysis which examined the QOL by marital status, the decline of EQ-5D in single people among patients with cancer was greater than that of other marital statuses (single: -7.533, p<0.05, marriage problems: -0.162, p=0.9045). In the case of survivors of cancer, there was no statistically significant decline. In the general population, the decline of EQ-5D was higher in the order single > marriage problems > married (single: -0.993, p<0.05, marriage problems: -0.961, p<0.05).

Upon analysis of EQ-VAS, single people had higher values than other marital statuses in patients with cancer (single: -7.742, p<0.05, marriage problems: -0.492, p=0.6878), and single people among survivors of cancer had higher values than other marital statuses (single: 7.339, p<0.05, marriage problems: -0.225, p=0.8162). In the general population, EQ-VAS values were higher in the order single > married > marriage problems (single: 0.422, p<0.05, marriage problems: -0.928, p<0.05) (Table 2).

Discussion

In order to examine the relationship between QOL and marital status in patients with cancer and survivors of cancer, targeting adults 19 years of age or older, we focused on marital status as one socioeconomic issue and then analyzed its association with QOL. Some differences were evident depending on whether we used EQ-5D or EQ-VAS, but we nonetheless observed differences in the QOL of patients with cancer, survivors of cancer, and the general population by marital status.

The EQ-5D of patients with cancer was a more sensitive indicator of the decline in QOL that occurred with single status than the decline associated with other marital statuses. Also, the decline

Table 2. Multilevel Analysis Results of EQ-VAS and EQ-5D by Presence of Cancer (estimated regression coefficient, p value*)

	EQ-5D ^a						EQ-VAS ^b					
	Patients		Survivors		General population		Patients		Survivors		General population	
Marital status												
Single	-7.533	0.0117	1.208	0.5548	-0.993	<0.0001	-7.742	0.0039	7.339	0.005	0.422	0.0003
Separation/Divorce/Bereavement	-0.162	0.9045	0.663	0.382	-0.961	<0.0001	-0.492	0.6878	-0.225	0.8162	-0.928	<0.0001
Married	-	-	-	-	-	-	-	-	-	-	-	-
Frequent depression for more than 2 weeks												
Yes	-13.354	<0.0001	-7.43	<0.0001	-6.858	<0.0001	-9.658	<0.0001	-6.101	<0.0001	-4.791	<0.0001
No	-	-	-	-	-	-	-	-	-	-	-	-
Awareness of stress												
Yes	-10.032	<0.0001	-2.955	<0.0001	-2.051	<0.0001	-10.193	<0.0001	-8.046	<0.0001	-6.16	<0.0001
No	-	-	-	-	-	-	-	-	-	-	-	-
Sex												
Male	0.554	0.6341	2.61	0.0001	0.549	<0.0001	-0.476	0.6473	-0.849	<0.0001	1.269	<0.0001
Female	-	-	-	-	-	-	-	-	-	-	-	-
Age (years)												
20-29	-	-	-	-	-	-	-	-	-	-	-	-
30-39	-0.553	0.923	1.679	0.5134	-0.533	<0.0001	19.946	0.0001	1.698	0.6047	-1.125	<0.0001
40-49	0.34	0.9508	2.577	0.2919	-0.803	<0.0001	19.172	0.0001	6.279	0.0444	-0.717	<0.0001
50-59	-2.96	0.5953	1.455	0.5499	-1.353	<0.0001	14.756	0.0032	6.45	0.038	-1.146	<0.0001
60-69	-6.265	0.262	-0.839	0.7316	-4.401	<0.0001	15.345	0.0023	4.523	0.1474	-3.386	<0.0001
70-79	-18.104	0.0015	-6.833	0.0064	-9.962	<0.0001	9.708	0.0582	2.745	0.3906	-7.271	<0.0001
Family income (thousand won)												
≤12,000	-5.213	0.0023	-4.046	<0.0001	-2.174	<0.0001	-10.692	<0.0001	-5.516	<0.0001	-3.446	<0.0001
12,000-24,000	-3.258	0.0668	-1.035	0.2642	-0.14	0.0263	-6.187	0.0001	-1.827	0.1226	-1.065	<0.0001
24,000-42,000	-2.418	0.1919	-0.271	0.767	0.033	0.5792	-6.302	0.0002	-1.776	0.1283	-0.601	<0.0001
>42,000	-	-	-	-	-	-	-	-	-	-	-	-
Education level												
Less than high school	0.498	0.7787	-1.266	0.1945	-2.422	<0.0001	1.887	0.237	-4.515	0.0003	-2.584	<0.0001
High school graduate	3.759	0.0282	-1.212	0.1808	-0.292	<0.0001	1.768	0.2503	-2.234	0.0533	-0.419	<0.0001
College graduate	-	-	-	-	-	-	-	-	-	-	-	-
Perceived health status												
Good	6.438	0.0015	4.316	<0.0001	2.613	<0.0001	11.311	<0.0001	11.489	<0.0001	9.584	<0.0001
Bad	-	-	-	-	-	-	-	-	-	-	-	-

*p values for results of multilevel analysis; ^aEQ-5D, EuroQOL five dimensions; ^bEQ-VAS, EuroQOL visual analog scale

in QOL of patients with cancer associated with single status was greater than that associated with marriage problems and married status using EQ-VAS. Although we did not investigate specific reasons for this result, EQ-VAS among single people was higher than that of any other marital status, in contrast to other results. Thus, a more detailed analysis is needed.

The results of our study have both similarities and differences compared with the results of previous studies. Previous studies were focused on QOL in cancer patients by treatment (Litwin et al., 1995), whereas our study only considered QOL by marital status. Some studies did examine the relationship between marital status and cancer, concluding that married people have improved survival rates compared with those who are single, divorced, or bereaved due to their social relationship with the spouse (Goodwin et al., 1987). Additionally, other studies found that social and family supports effect positive outcomes for the mental health of patients with cancer (Given et al., 2001; Kornblith et al., 2001; Michael et al., 2002; Karnell et al., 2007). Similarly, in the present study, married people generally had higher QOL scores than did those in different marriage status groups, and married people showed less of a decline in QOL by incidence of cancer than people of other marital status.

This study has both strengths and limitations. The data used were from a large representative nationwide population, making it possible to understand the health of provincial residents, to establish health policies based on evidence, and to evaluate them. Above all, these data reflected the experiences of residents of particular provincialities, not patients.

Furthermore, to our knowledge, this is the first report

describing the relationship between QOL (measured by EQ-VAS and EQ-5D) and cancer by marital status. Previous studies focused only on QOL by socioeconomic status and the relationship between cancer and marital status (Goodwin et al., 1987; Burström et al., 2001; Kravdal, 2001), and some of these studies did not measure QOL using EQ-VAS or EQ-5D (Kim et al., 1999; Kobayashi et al., 2008).

However, this study was cross-sectional in nature; hence, there are limitations in interpreting the causal relationship between QOL and marital status in patients with cancer and survivors of cancer. In order to more accurately measure this relationship, other issues must be considered. Our study also did not consider the types and stages of cancer, so the results may not be applicable to all types of cancer, necessitating further study. Finally, this study only analyzed 1 year of survey data; analysis of longitudinal data, which is difficult to obtain, would provide more accurate results.

Despite these limitations, this study suggests a relationship between marital status and QOL in patients with cancer and survivors of cancer. Sudden changes in marital status and incidence of cancer are expected to have a significant future impact on the QOL of Koreans. Realistically, these changes would be difficult to implement for managing the marital status of patients with cancer and survivors of cancer. However, it is possible to seek means to assist patients with cancer and survivors of cancer who are experiencing marriage problems. It is also possible for the QOL to decline due to factors other than marital status, so it is necessary to prevent decline in QOL in advance through government-level support for people experiencing marriage problems among patients

with cancer. Thus, this study would help health policy makers how to determine target population and support in making policy choices.

In conclusion, there may be a significant relationship between marital status and QOL in patients with cancer and survivors of cancer, though further study is needed to investigate this relationship in detail. Then, policy alternatives and efforts to prevent and manage the decline in QOL of patients with cancer associated with marital problems may become possible.

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