

RESEARCH ARTICLE

Adherence to Health-Related Lifestyle Behavior Recommendations and Association with Quality of Life among Cancer Survivors and Age-Matched Controls in Korea

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Abstract

Background: This study was conducted to determine the relationship between lifestyle behavior and quality of life (QoL) among cancer survivors in Korea. **Materials and Methods:** Data for a total of 471 (173 men, 298 women) cancer survivors (CS) over 40 years old were obtained from the database of the 4th Korean National Health and Nutrition Examination Survey (KNHANES IV). An identical number of subjects of the same age, sex, and education who had no restrictions in physical activity were randomly selected from the database and represented the control group (CG). Drinking, smoking, and exercise behavior were assessed. **Results:** The number of heavy drinkers was lower in CS (9.4%) than in CG (15.8%) ($p < 0.01$); similarly, there were fewer smokers in CS (9.1%) than in CG (14.0%) ($p < 0.05$). The percentage of individuals engaging in vigorous, moderate, and low-intensity exercise did not differ between CS (13.6%, 14.7%, and 50.0%) and CG (14.3%, 13.4%, and 49.7%, respectively). No differences in Euro QoL Questionnaire 5-Dimensional Classification (EQ-5D) scores on both drinking and smoking behaviors were noted. Compared to the non-exercisers, the low-intensity exercisers in CG (0.91 ± 0.10 vs. 0.94 ± 0.09), vigorous-intensity exercisers in CS (0.84 ± 0.62 vs. 0.91 ± 0.11), and low-intensity exercisers in CS (0.82 ± 0.22 vs. 0.88 ± 0.13) scored higher on the EQ-5D. **Conclusions:** Although cancer survivors practiced more conscious health behavior in drinking and smoking, their engagement in exercise did not differ from that of non-cancer survivors. Since exercise engagement increases QoL in general, implementation of an educational program that promotes exercise engagement in cancer survivors may be required.

Keywords: Exercise - QOL - cancer patient - physical activity - drinking - smoking

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Introduction

Recently, the survival rate and survival time in cancer have been improving. Between 1999 and 2009, cancer incidence in Korea increased at an annual average of 3.4% as per statistics of the Korea Central Cancer Registry (KCCR). The survival rate has been consistently increasing, and it was reported that the five-year survival rate from 2005 to 2009 was around 64.1%, and that one out of every 100 people is a cancer survivor (Korea Central Cancer Registry, 2012).

However, after treatment, cancer survivors usually face physical and psychological problems (Kye and Park, 2012) and are at a greater risk of cardiovascular disease, diabetes, osteoporosis, and decline of physical function than the general population (Demark-Wahnefried et al., 2009; National Cancer Institute, 2012). Therefore, cancer survivors are encouraged to practice health habits such as eliminating tobacco exposure, eating a nutritious diet, reducing alcohol intake, and increasing physical activity

to improve physical function, mental ability, and disease-free survival.

The American Association for Cancer Research (AACR) has estimated the percentage of cancer cases caused by the following identifiable and/or potentially preventable factors: tobacco (33%), excess weight and obesity (20%), diet (5%), lack of exercise (5%), and alcohol (3%) (American Association for Cancer Research, 2012). Danaei and colleagues reported in a review that smoking and drinking are associated with many kinds of cancer-related risk factors. Such mutual interaction may increase cancer mortality rate (Danaei et al., 2005).

On the other hand, a team of international experts from the American Institute for Cancer Research (AICR) reported that physical activity has advantages in the prevention of cancer and in improving patients' psychological and physiological health during and after treatment. Advanced nations are leading in large-scale studies and initiatives on different cancer types. Alternatively, lifestyle intervention has become an

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important issue in cancer management and prevention (Secretan et al., 2009). Even though the government leads cancer survivorship programs such as the 10-years Cancer Plan in Korea, there are still some limitations. Most research has investigated the importance of lifestyle modification in cancer survival but there is no such study conducted in a local Korean setting; thus, lifestyle guidelines for Korean cancer survivors remain undeveloped (Kim, 2010). We deem that there is a need for a cancer survivorship program and guidelines specifically tailored to the situation in Korea.

In this study, we assessed the health-related lifestyle of cancer survivors in Korea after exploring the relationship between quality of life (QoL) and lifestyle. In addition, we discussed the key issues of health care in cancer survivors. The findings from this study could be utilized for the development of cancer survivorship program and guidelines for the promotion of a healthy lifestyle among Korean cancer survivors.

Materials and Methods

Data sources

The 4th Korea National Health and Nutrition Examination Survey (KNHANES IV) used in this article was performed by Korea Centers for Disease Control and Prevention. It collected pertinent data regarding national health condition, health-related knowledge and behaviors, disease prevalence rate, and nutrition levels.

The KNHANES was first conducted in 1998, and the fifth survey is currently underway. Raw data from such surveys can be used for the development of health policies and research, except for the survey date and location. This study was based on the KNHANES IV.

Study population

The subjects, who were at least 40 years old at the time of the KNHANES, were divided into the cancer survivor (CS) and control group (CG). Of the 9,744 participants who were previously or newly diagnosed with cancer, 471 (173 men, 298 women) were allocated to the CS group. Of the 8290 participants who were never diagnosed with cancer or had no physical activity limitations, 471 (173 men, 298 women) were selected for the CG group; the CG members were matched for age and sex with the CS.

The survey data were publicly available and the study design was approved by the Institutional Review Board of the Catholic University (MC12EASI0053).

General characteristics of subjects

The sample comprised 942 persons. Sex, age, education, economic status, occupation, and marital status are expressed in frequency (N) and percentage (%). The economic status of the participants was classified into three categories: high (top 25%), middle (top 26-74%), or low (bottom 25%). Occupation was classified into white collar (administrator, professional, and office worker); blue collar (manufacturing, mining, construction, mechanical work, maintenance, technical installation, and various other types of physical work); or non-employed, student, or housewife. Participants from the CS group were

classified according to their type of cancer and length of survival after diagnosis.

Health-related behavior factors

Assessment of health behaviors, including drinking, smoking, and exercise, was performed. Drinking behavior was assessed using the Alcohol Use Disorders Identification Test (AUDIT; a score of ≥ 12 points indicates a heavy drinker, < 12 points, a moderate one). The current smokers and nonsmokers were also identified in the group as well as the exercisers and non-exercisers; the exercisers were further divided into vigorous, moderate, and low-intensity exercisers. Vigorous-intensity exercise was defined as sessions of > 20 minutes more than 3 times per week of jogging, climbing, bicycling (high speed), swimming (high speed), soccer, basketball, jump rope, squash, tennis (singles), or job activity (such as moving heavy loads). Moderate exercise was defined as sessions of > 30 minutes more than 3 times per week of swimming (low speed), tennis (doubles), volleyball, badminton, table tennis, or job activity (such as light load moving). Low-intensity exercise was defined as walking or commuting for > 30 minutes more than 3 times per week.

Quality of life (QoL)

Health-related QoL was assessed using the Euro QoL Questionnaire 5-Dimensional Classification (EQ-5D). It consists of 5 dimensions: mobility, self-care, usual activity, pain/discomfort, and anxiety/depression. Each dimension is classified into three categories: extreme problems, some problems, or no problems. Furthermore, each dimension is scored using the EQ-5D index: 0 as the worst health status and 1 as the best health status.

Analysis

SPSS 19.0 for Windows was used to analyze the demographic characteristics, percentages, means, and standard deviations. A chi-square test was used to determine associations in drinking, smoking, and exercise behaviors between groups. An independent t-test was used to determine differences in health-related QoL between groups.

Results

Subject characteristics

Sample characteristics are shown in Table 1. There were about 1.7 times more women than men. The majority of the subjects (34.6%) were in their 60s, followed by those over 70 (30.1%) and in their 50s (20.0%) and 40s (15.3%). Most of the subjects in the two groups were married (CG: 98.3%, CS: 99.4%). Over 90% had blue-collar jobs or were not employed, students, or housewives (CG: 91.5%, CS: 93.2%). Most of them had middle economic status (CG: 48.4%, CS: 41.0%), and only few had higher education (CG: 11.7%, CS: 13%).

The cancer types of the subjects in CS are shown in Table 2. The majority of them have survived cancer for over 5 years, followed by those who had survived cancer for 1-2 years, 3-4 years, and < 1 year. Gastric cancer accounted for the highest percentage of cancer cases

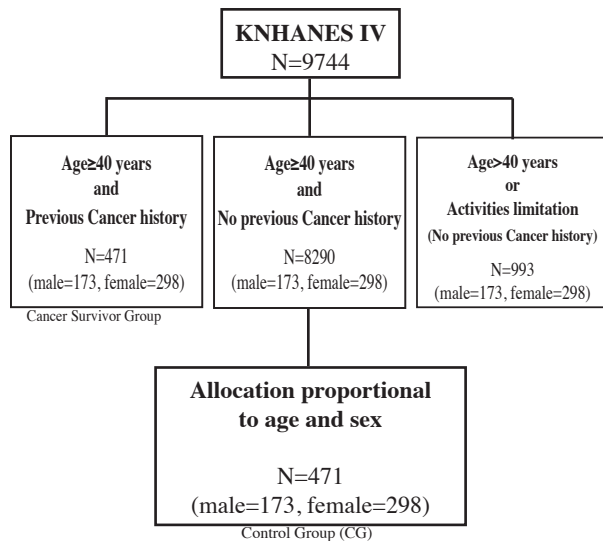


Figure 1. Participant Flowchart

Table 1. Sample Characteristics

| Variables | Group | Control Group (N=471) N (%) | Cancer Survivors (N=471) N (%) |
|-----------------|---------------------------|-----------------------------------|--------------------------------------|
| Sex | Male | 173 (36.7) | 173 (36.7) |
| | Female | 298 (63.3) | 298 (63.3) |
| Age (y) | 40-49 | 72 (15.3) | 72 (15.3) |
| | 50-59 | 94 (20.0) | 94 (20.0) |
| | 60-69 | 163 (34.6) | 163 (34.6) |
| | ≥70 | 142 (30.1) | 142 (30.1) |
| Marital status | Married | 463 (98.3) | 468 (99.4) |
| | Unmarried, No answer | 7 (1.5) 1 (0.2) | 3 (0.6) 0 (0) |
| | Occupation | | |
| Occupation | White collar jobs | 30 (6.4) | 31 (6.6) |
| | Blue collar jobs | 212 (45.0) | 149 (31.6) |
| | No job/student/house wife | 219 (46.5) | 290 (61.6) |
| | No answer | 10 (2.1) | 1 (0.2) |
| Economic status | Low | 131 (27.8) | 166 (35.2) |
| | Middle | 228 (48.4) | 193 (41.0) |
| | High | 87 (18.5) | 98 (20.8) |
| | No answer | 25 (5.3) | 14 (3.0) |
| Education | ≤Elementary school | 227 (48.1) | 246 (52.2) |
| | Middle to high school | 184 (39.1) | 164 (34.8) |
| | ≥College | 55 (11.7) | 61 (13.0) |
| | No answer | 5 (1.1) | 0 (0) |

Table 2. Cancer Type of the Subjects

| Variables | Cancer survivors (N=471) | N (%) |
|----------------------------|--------------------------|------------|
| Type of cancer | Gastric cancer | 98 (20.8) |
| | Cervical cancer | 68 (14.4) |
| | Breast cancer | 56 (11.9) |
| | Colorectal cancer | 35 (7.4) |
| | Lung cancer | 18 (3.8) |
| | Liver cancer | 17 (3.6) |
| | Other cancer | 179 (38.0) |
| Period after diagnosis (y) | <1 | 36 (7.6) |
| | 1-2 | 100 (21.2) |
| | 3-4 | 79 (16.8) |
| | ≥5 | 247 (52.4) |
| | No answer | 9 (1.9) |

(20.8%), followed by cervical, breast, colorectal, lung, liver, and others.

Health-related behaviors

Table 3 shows the results of the between-group comparison of health related behaviors. The number of heavy drinkers was lower in CS than in CG (9.4% vs. 15.8%, $p<0.01$). There were also significantly fewer smokers in CS than in CG (9.1% vs. 14.0%, $p<0.05$). In contrast, the number of people engaging in exercise behavior did not differ significantly between the two groups.

Quality of life

An independent t-test was applied to determine whether QoL differs across persons engaging in each of the health-related behaviors studied (Table 4). Results showed that drinkers and smokers' QoL scores did not

Table 3. Comparison of Health-Related Lifestyle of the Subjects

| Variables | Assessment | Control Group N % | Cancer Survivors N % | P ^a |
|------------------------|-----------------------------|----------------------|-------------------------|----------------|
| Drinking | Moderate | 287 84.2 | 318 90.6 | 0.011 |
| | Heavy | 54 15.8 | 33 9.4 | |
| Smoking | Smoker | 66 14 | 43 9.1 | 0.019 |
| | Non-smoker | 405 86 | 428 90.9 | |
| Exercise behavior | Vigorous-intensity exercise | | | |
| | Yes | 67 14.3 | 64 13.6 | 0.757 |
| | No | 400 85.7 | 405 86.4 | |
| | Moderate-intensity exercise | | | |
| | Yes | 62 13.4 | 69 14.7 | 0.518 |
| | No | 402 86.6 | 400 85.3 | |
| Low-intensity exercise | | | | |
| Yes | 235 50.3 | 234 50 | 0.922 | |
| No | 232 49.7 | 234 50 | | |

^aCalculated by a chi-square test

Table 4. Differences in EQ-5D Scores according to Subjects' Lifestyle Characteristics

| Variables | Group | Control Group (N=471) Mean±SD | P ^b | Cancer Survivors (N=471) Mean±SD | P ^b |
|------------------------|-----------------------------|-------------------------------------|----------------|--|----------------|
| Drinking | Moderate | 0.93±0.10 | 0.105 | 0.86±0.18 | 0.796 |
| | Heavy | 0.95±0.08 | | 0.86±0.20 | |
| Smoking | Smoker | 0.93±0.09 | 0.629 | 0.85±0.20 | 0.451 |
| | Non-smoker | 0.93±0.10 | | 0.85±0.18 | |
| Exercise behavior | Vigorous-intensity exercise | | | | |
| | Yes | 0.94±0.78 | 0.07 | 0.91±0.11 | <0.001 |
| | No | 0.92±0.10 | | 0.84±0.62 | |
| | Moderate-intensity exercise | | | | |
| | Yes | 0.94±0.08 | 0.218 | 0.86±0.18 | 0.656 |
| | No | 0.92±0.10 | | 0.85±0.18 | |
| Low-intensity exercise | | | | | |
| Yes | 0.94±0.09 | 0.005 | 0.88±0.13 | 0.001 | |
| No | 0.91±0.10 | | 0.82±0.22 | | |

^aEQ-5D index scores (0:Lowest possible health, 1:Best possible health), ^bCalculated by independent t-test

differ significantly between the two groups. In both CG and CS groups, the low-intensity exercisers had higher QoL scores than the non-low intensity exercisers (CG: 0.94 ± 0.09 vs. 0.91 ± 0.10 , $p < 0.05$, CS: 0.88 ± 0.13 vs. 0.82 ± 0.22 , $p < 0.05$). The vigorous-intensity exercisers in CS had higher QoL scores than the non-vigorous-intensity exercisers (0.91 ± 0.11 vs. 0.84 ± 0.62 , $p < 0.001$).

Discussion

This study investigated the relationship between QoL and lifestyle to establish a basis for the development of a cancer survivorship program and lifestyle guidelines for Korean cancer survivors, using the KNHANES. According to the National Cancer Center, the number of cancer survivors worldwide has increased rapidly worldwide, and 6 of 10 cancer patients will survive the disease for more than 5 years (Korea Central Cancer Registry, 2012).

Managing cancer survivors is a significant area of interest of national health service and a great calling of our time. The governments of advanced nations have already started interventions related to lifestyle factors (diet, exercise, smoking, and weight loss). In particular, the United States seems to have made more efforts to counteract the health problems of cancer survivors than other countries. The National Cancer Center was opened in 1937 (National Cancer Institute, 2012), and other national organizations such as the National Cancer Institute (NCI) and the National Coalition for Cancer Survivorship (NCCS) are already fully operational. These organizations strive to improve the health and welfare of cancer survivors (Kim, 2010).

South Korea also initiated the 10-year Cancer Plan on a national level to prevent and treat cancer in 1996–2005, and the second 10-year Cancer Plan is currently underway (Ministry of Health and Welfare, 2011). It attempted to coordinate various approaches such as symposiums or workshops for cancer survivors in institutes and hospitals. However, cancer survivorship programs in Korea are disorganized and have not shown evidence of efficacy (Kim, 2010; Chung et al., 2011). Understanding cancer survivors is essential for their management but even cohort studies about their health-related behavior have not been conducted. While the KNHANES IV was not specifically administered to cancer survivors, it is one of the few surveys that provide substantial information on cancer survivors on a national level.

This survey shows that 471 people of 9744 people were cancer survivors who have been diagnosed or undergoing cancer treatment. However, the National Coalition for Cancer Survivorship (NCCS) defines a cancer survivor as a person who has survived for more than 5 years after cancer treatment. In a broader sense, a cancer survivor is also defined as a person who has experienced cancer (National Cancer Institute, 2011). The government of Korea has not accurately defined cancer survivors; hence, we used the broader definition in this study.

Cancer survivors are consistently suffering because of fatigue, depression, physical problems, and pain during or after the treatment. For this reason, the QoL for cancer

survivors was lower than that of non-cancer survivors in various studies (Kim, 2010; Bloom et al., 2012; Turkoglu and Kilic, 2012). Bloom et al. reported that we recognize health conditions differently according to individual expectations or hopes (Bloom et al., 2012). On this basis, even if cancer survivors make excellent progress after the operation, their QoL remains relatively poor, owing to the fear of recurrence, uncertainty, disappointment in body changes, depression, and fatigue. The key issue of healthcare in cancer survivors is understanding the problems that they are facing.

Health-related behaviors to improve QoL in cancer survivors play an important role in the prevention of cancer recurrence and improvement of overall health. In the current study, the reported unhealthy habits—smoking, obesity or overweight, unhealthy diet, lack of exercise, and excessive alcohol consumption—were risk factors for cancer that should be modified. Furthermore, obesity and inactivity are associated with at least 8 kinds of cancer risk, alcohol intake is associated with at least 7 kinds of cancer risk, and smoking is known to cause 18 kinds of cancer (Secretan et al., 2009; American Association for Cancer Research, 2012).

Most people become aware of good lifestyle habits for cancer survival through health campaigns, the mass media, and results of previous studies. Jo and Jung (2011) found that more than 80% of the respondents in their sample knew of 5 of the 10 codes about lifestyle-related knowledge of cancer prevention: (i) Smoking and indirect smoking can lead to cancer (81.1%). (ii) Eating enough vegetables and fruits is helpful in preventing cancer (87.9%). (iii) Consumption of burnt or charred foods can cause cancer (88.7%). (iv) Walking for at least 30 minutes five or more days per week helps prevent cancer (88.3%). (v) Maintaining a normal body weight is helpful in preventing cancer (90.3%). The results from the aforementioned study were able to approximate the level people's knowledge of the association of smoking, diet, and exercise with cancer, although generalizing these results to the Korean population should be done cautiously.

Our study shows that cancer survivors seem to not only be aware of lifestyle factors but also voluntarily change their lifestyle. They drink and smoke less than the non-cancer survivors. However, we did not find a difference between cancer survivors and non-cancer survivors in exercise behavior. Together, these results suggest that cancer survivors are indeed conscious about their diet and the health habits that are unsafe for their condition (e.g., smoking); however, they are not aware of the benefits of exercise compared with non-cancer survivors.

Further, the EQ-5D score, which indicates QoL, had no relationship with drinking and smoking behavior; it was positively associated with only exercise behavior. Thus, cancer survivor did not modify their exercise behavior despite its strong relationship with QoL, even if they changed other health-related behaviors. This result was consistent with previous reports (Irwin et al., 2004; Holmes et al., 2005; Holick et al., 2008; Wang and Chung, 2012) in which lack of exercise was also observed among cancer survivors. This raises the question of why they do not change their exercise behavior despite knowing that

exercise is good for health.

Previous research (Irwin et al., 2004; Stevinson et al., 2009) on exercise or physical activity levels among cancer survivors showed that most of the cancer survivors were not meeting the physical activity guidelines (Tucker Welk and Beyler, 2011) of “moderate-intensity physical activity for at least 30 minutes, five or more days of the week” or “vigorous-intensity physical activity for at least 20 minutes, five or more days of the week.” A similar study (Blaney et al., 2013) revealed that the exercise barriers of cancer survivors in Northern Ireland were mainly health- or treatment-related factors (e.g., illness, pain, weakness, and fatigue) and environmental factors (e.g., weather and lack of facilities for cancer survivors). Loh et al. (2011) reported that barrier factors for physical activity did not substantially differ among China, India, and Malaysia.

Likewise, Wang and Chung (2012) reported that some breast cancer survivors who had not drunk alcohol or smoked had improved health, although they did not attempt to change their exercise behavior. Their study did not explore the reasons for such behavior. In practice, exercising regularly was relatively difficult because of certain constraints (costs, time, effort, etc.). Cancer survivors in general have not received proper education on exercise behavior. In particular, healthcare professionals dealing with cancer survivors have not adequately utilized the “teachable moment,” which is the best moment for them to change their lifestyle, that will subsequently improve their health (Blanchard et al., 2008; Senore et al., 2012).

For decades, there has been a paradigm shift regarding exercise for cancer survivors. Exercise treatment for cardiovascular diseases is considered an essential inclusion nowadays, which was previously thought to be unnecessary. In the late 1990s, experts advocated the importance of “rest” for cancer survivors (Lucia et al., 2003). In the early 2000s, there was accumulating evidence that exercise helps cancer survivor improve their health and prevents complications (Schmitz et al., 2010; Speck et al., 2010). Even the ACSM has integrated exercise into its guidelines for cancer survivors (Schmitz et al., 2010).

Unfortunately, specific exercise recommendations and precautions during the preparatory stage, screening test, or treatment have not been properly formulated for each cancer type. Personalized care should be provided after a thorough assessment of the type and stage of cancer, with consideration for the patient’s general health condition, exercise behavior, fitness level, and cancer complications. Future studies should attempt to personalize a cancer care system that is based on various factors, including the physical, emotional, and mental state of the individual. Establishing such system also entails professionalism and cautionary measures.

However, this study has limitations in that it could not infer causality. Nevertheless, it is expected that these results can be used for the development of a health promotion program specifically tailored to Korean cancer survivors. In conclusion, we encourage cancer survivors to exercise for the maintenance of a healthy lifestyle and improvement of their QoL.

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References

- American Association for Cancer Research (2012). AACR cancer progress report 2012; making research count for patients: a new day. American Association for Cancer Research.
- Blanchard CM, Courneya KS, Stein K (2008). Cancer survivors’ adherence to lifestyle behavior recommendations and associations with health-related quality of life: results from the American Cancer Society’s SCS-II. *J Clin Oncol*, **26**, 2198-204.
- Blaney JM, Lowe-Strong A, Rankin-Watt J, et al (2013). Cancer survivors’ exercise barriers, facilitators and preferences in the context of fatigue, quality of life and physical activity participation: a questionnaire-survey. *Psychooncology*, **22**, 186-94.
- Bloom JR, Stewart SL, Oakley-Girvan I, et al (2012). Quality of life of younger breast cancer survivors: persistence of problems and sense of well-being. *Psychooncology*, **21**, 655-65.
- Chung JY, Ann KY, Park JH, et al (2011). The case study of operation and experience of exercise for female cancer patients. *Journal of the Korean Society of Living Environmental System*, **18**, 129-39.
- Danaei G, Vander Hoorn S, Lopez AD, et al (2005). Causes of cancer in the world: comparative risk assessment of nine behavioural and environmental risk factors. *Lancet*, **366**, 1784-93.
- Demark-Wahnefried W, Morey MC, Sloane R, et al (2009). Promoting healthy lifestyles in older cancer survivors to improve health and preserve function. *J Am Geriatr Soc*, **57** Suppl 2, S262-4.
- Holick CN, Newcomb PA, Trentham-Dietz A, et al (2008). Physical activity and survival after diagnosis of invasive breast cancer. *Cancer Epidemiol Biomarkers Prev*, **17**, 379-86.
- Holmes MD, Chen WY, Feskanich D, et al (2005). Physical activity and survival after breast cancer diagnosis. *JAMA*, **293**, 2479-86.
- Irwin ML, McTiernan A, Bernstein L, et al (2004). Physical activity levels among breast cancer survivors. *Med Sci Sports Exerc*, **36**, 1484-91.
- Jo HS, Jung SM (2011). Audience segmentation to promote lifestyle for cancer prevention in the Korean community. *Asian Pac J Cancer Prev*, **12**, 869-74.
- Kim SH (2010). Understanding cancer survivorship and its new perspectives. *Asian Oncology Nursing*, **10**, 11.
- Korea Central Cancer Registry NCC (2012). Annual report of cancer statistics in Korea in 2010. Ministry of Health and Welfare.
- Kye SY, Park K (2012). Psychosocial factors and health behavior among Korean adults: a cross-sectional study. *Asian Pac J Cancer Prev*, **13**, 49-56.
- Loh SY, Chew SL, Lee SY (2011). Barriers to exercise: perspectives from multiethnic cancer survivors in Malaysia. *Asian Pac J Cancer Prev*, **12**, 1483-8.
- Lucia A, Earnest C, Perez M (2003). Cancer-related fatigue: can exercise physiology assist oncologists? *Lancet Oncol*, **4**, 616-25.
- Ministry of Health & Welfare (2011). White paper of health and welfare. Ministry of Health & Welfare.
- National Cancer Institute (2011). Cancer control continuum.

- Maryland: [accessed on November 3, 2012] Available at: <http://cancercontrol.cancer.gov/OD/continuum.html>.
- National Cancer Institute (2012). Cancer survivorship research. Maryland: [accessed on November 3, 2012] Available at: <http://www.cancer.gov/>.
- Schmitz KH, Courneya KS, Matthews C, et al (2010). American college of sports medicine roundtable on exercise guidelines for cancer survivors. *Med Sci Sports Exerc*, **42**, 1409-26.
- Secretan B, Straif K, Baan R, et al (2009). A review of human carcinogens--part E: tobacco, areca nut, alcohol, coal smoke, and salted fish. *Lancet Oncol*, **10**, 1033-4.
- Senore C, Giordano L, Bellisario C, et al (2012). Population based cancer screening programmes as a teachable moment for primary prevention interventions. A review of the literature. *Front Oncol*, **2**, 45.
- Speck RM, Courneya KS, Masse LC, et al (2010). An update of controlled physical activity trials in cancer survivors: a systematic review and meta-analysis. *J Cancer Surviv*, **4**, 87-100.
- Stevinson C, Steed H, Faught W, et al (2009). Physical activity in ovarian cancer survivors: associations with fatigue, sleep, and psychosocial functioning. *Int J Gynecol Cancer*, **19**, 73-8.
- Tucker JM, Welk GJ, Beyler NK (2011). Physical activity in U.S.: adults compliance with the physical activity guidelines for americans. *Am J Prev Med*, **40**, 454-61.
- Turkoglu N, Kilic D (2012). Effects of care burdens of caregivers of cancer patients on their quality of life. *Asian Pac J Cancer Prev*, **13**, 4141-5.
- Wang HH, Chung UL (2012). Healthy lifestyle changes during the period before and after cancer diagnosis among breast cancer survivors. *Asian Pac J Cancer Prev*, **13**, 4769-72.