A Needs Analysis for the Development of Forest Healing Programs: Focusing on Cancer Patients

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ABSTRACT

Background and objective: Cancer is the number one cause of death in Korea, and it affects any part of the body regardless of gender and age. Forest healing is a treatment that maximizes the effect of treatment and improves the quality of life. This study aims to provide basic data for the development and implementation of differentiated forest healing programs for cancer patients based on the survey on their interest and needs for the programs.

Methods: The subjects were those diagnosed with cancer from October 2018 to April 2019, and this study used 144 copies of the questionnaire retrieved. The sample size of this study ($n = 144$) was the appropriate size required by G-Power, and the collected responses were analyzed using SPSS 25.0.

Results: In the frequency analysis on the interest in forest healing, 79.2% of the subjects had no experience participating in forest healing, but 87% were aware of it, and 82.6% showed the intention to participate in forest healing programs. This indicates that even though not many of them have experience participating in forest healing, they showed high interest and needs for participation. They preferred to participate in spring (29.9%) and fall (27.8%), in programs carried out for 1.5–2 hours in the morning on weekdays.

Conclusion: This study has implications for the analysis on forest healing needs of cancer patients, and it is necessary to plan, develop, and implement differentiated forest healing programs that meet the needs of the cancer patients depending on their characteristics. There is also a need to plan forest healing program that can promote both psychological stability and physical health of cancer patients and verify and evaluate their effects based on specialized training of forest healing instructors.

Keywords: forest therapy program, forest care program, preferences, visitor characteristics

Introduction

People today show greater interest in promoting health and preventing diseases, and the development of medical technology has led to the longer average lifespan. Nonetheless, stress, cerebrovascular diseases, neurosis, anxiety, depression, suicide, heart diseases, and cancer patients are increasing, and cancer is the number one cause of death in Korea. According to the 2018 statistics of National Cancer Information Center, total 79,153 deaths were caused by cancer, most of which were by lung cancer (22.5%, 17,852

deaths), followed by liver cancer (13.4%), colorectal cancer (11.1%), gastric cancer (9.8%), and pancreatic cancer (7.6%). By gender and mortality rates of major cancer types, 48,898 men died from cancer, indicating that 30.3% of all deaths in men are caused by cancer. Cancer with highest mortality rate in men was lung cancer (27%, 13,188 deaths), followed by liver cancer (15.9%), gastric cancer (10.4%), and colorectal cancer (10.1%). Total 30,255 women died from cancer, indicating that 22.0% of all deaths in women are caused by cancer. Cancer with highest mortality rate in women was lung cancer (15.4%, 4,664 deaths), followed

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by colorectal cancer (12.8%), pancreatic cancer (9.4%), and liver cancer (9.3%) (National Cancer Information Center, 2019).

Industrialization and urbanization increased people's interest in recreation as well as desires for stability and recovery of health the mind and the body, which led to growing interest in forests for health and precaution against diseases. Forests began to be perceived as a place for relaxation and healing in the Forestry Culture and Recreation Act amended in March 2010. According to Article 2, paragraph (4) of this Act, forest healing is defined as 'immune-strengthening and health-promoting activities, which utilize a variety of elements of the forest, including scents and scenic views' (Korea Forest Service, 2011). As an intervention for treatment and recovery of cancer patients, there is an increasing need for a customized forest healing program based on target analysis in the planning process using natural ingredients of forests (Hong et al., 2010). Forests and natural materials are known to have a positive impact on emotional, psychological, and physical stability as well as self-realization and to alleviate depression, and thus used to treat, recover, and alleviate diseases such as cancer (Shin et al., 2007). Forest activities may be a physiological and psychological treatment as they reduce stress and increase alpha waves, and also affect the immune function (Park, 2010). In the attention restoration theory, forests help recover health physiologically and psychologically through being away, extent, fascination, compatibility, and comfort (Kaplan, 1995). Forest healing programs for subjects visiting the forest require a needs analysis according to the frequency of forest visits and a preference analysis according to the level of stress (Lee and Kim, 2011). A forest healing program that meets the characteristics and therapeutic goals must be developed depending on the subjects (Kim et al., 2014a). For the analysis of needs and preferences of the subjects, it is necessary to determine the theme, therapy, and accurate subject information (Kim, 2016b), and to develop a differentiated and customized program based on the disease through analysis of activities (Son et al., 2012). To maximize the therapeutic effects, activities must be carried out in forests with abundant physiological conditions (air, water, sunlight, anion, place, exercise, herbs, terpene) and mental conditions (Morita therapy, Zen, be-

havior, music, amusement, kinesitherapy, autogenic training, forest smells, sounds of birds, winds, anion) (Kim, 2006). As such, previous studies had emphasized the need to develop a differentiated and customized program with preference and needs analyses according to the subjects visiting the forest. However, it is difficult to find research cases that analyzed the preference and needs for forest healing programs targeting cancer patients using the healing elements of the forest. Accordingly, this study was conducted to provide basic data for development and implementation of a differentiated forest healing program through surveys and analysis on interests and needs for forest healing with potential cancer patients that will be participating in the forest healing program.

Research Methods

Subjects and survey method

To develop the survey items that meet the purpose of this study, we analyzed 18 previous studies and came up with total 60 items: 6 demographic questions to determine the subjects, 9 questions on interest in forest healing, 6 questions on preference in forest healing programs (psychotherapy, kinesiology, climate therapy, plant therapy, water therapy, diet therapy), 25 sub-items, 4 questions on preference in the purpose of participating in a forest healing program (physical/psychological/social/cognitive), and 16 sub-items, with the preference and purpose developed to be rated on a five-point Likert scale (Table 1). To improve completeness of the questionnaire, five related experts (two Forest Therapist-Grade 1, forest education specialist, nurse, Horticultural Therapist Registered for Wellbeing-Grade I) developed and reviewed the questionnaire. Hospitalized cancer patients were excluded from the subjects due to the nature of this study. The subjects were recruited through cancer patients' self-help groups and health centers in some parts of Gyeonggi-do, Gwangju (Jeonnam), Jinju (Gyeongnam), Jeju-do, Yesan and Seosan (Chungnam), and Cheongju (Chungbuk), among those diagnosed with cancer from October 2018 to April 2019. After explaining the intent and purpose of this study, we

Table 1. Analysis of previous studies

Author	Target	Contents
Kim et al. (2002)	116 Cancer patients	Development of tools required for cancer patients
Kim (2006)	Theoretical consideration	Characteristics of healing elements
Park (2010)	Forest recreation 12 people x 24 area	Forest recreation activities and programs
Lee et al. (2011)	24 forest healing program	Program target, content and composition analysis
Lee and Kim (2011)	600 National recreational forest visitors	Visitors' behaviors and needs of recreational forest
Son et. al. (2012)	465 Forest road visitors	Preference of forest road recreation program
Baik and Kim (2014)	110 Cancer patients	Health needs
Choi and Ha (2014)	28 Cancer patients	Forest activity program
Kim et al. (2014a)	613 General adults	Forest and forest road preference
Kim et al. (2014b)	516 General adults	Preference according to demographic characteristics
Kim Y.H. et al. (2015a)	245 General adults	MBTI personality type program preference
Kim Y.G. et al. (2015b)	27 Cancer patients	Forest activity program
Yeom et al. (2015)	22 Program experts	Forest healing program contents
Kim (2016a)	620 Adults in their 20s-60s	Preference according to stress
Kim (2016b)	260 Adult men and women	Program preference
Kim (2016c)	660 Adults in their 20s-60s	Forest healing program requirements
Lee et al. (2016)	2,169 Healing forest guest	Satisfaction with healing forest program
Park and Koo (2018)	300 Incheon Grand Park	Purpose of participation in forest healing programs

retrieved the self-administered survey from those who wanted voluntary participation and gave them serial numbers. Total 162 copies of the questionnaire were retrieved, but we used 144 copies for statistical analysis excluding 18 copies that lack accuracy and statistics.

Methods of data analysis

The survey responses were analyzed using SPSS 25.0. We used frequency analysis on the demographic characteristics and questions about interest in forest healing, descriptive statistics on preference in forest healing programs and purpose of forest healing to verify the expected outcomes of participation, chi-squared test and Fisher's exact test to verify the differences of interest in forest healing depending on gender and name of the disease, and independent samples t-test and one-way ANOVA on preference in forest healing programs and purpose of the programs to verify the difference in preference.

Results and Discussion

Demographic characteristics of the subjects

The demographic characteristics of the subjects were analyzed by gender, age, marital status, occupation, and education. 30.6% were men (44 subjects) and 69.4% were women (100 subjects), most of which were in their 50s, and the female participation rate was higher since it was difficult to retrieve the survey from the male participants. 84% of them were married (121 subjects), and most of them were full-time homemakers (37.5%, 54 subjects), followed by professional practice, service, teaching/office, and production. Most of them were high school graduates (45.8%, 66 subjects), followed by middle school graduates, university graduates or higher, and elementary school graduates. 7.7% of the subjects were under the age of 39 (11 subjects) and 13.2% were over 70 (19 subjects), and they had a variety of occupations (Table 2).

Clinical characteristics of the subjects

The subjects received treatment from minimum 1 month

Table 2. Demographic characteristics of the research subject

Variable	Category	n	Percent(%)
Gender	Male	44	30.6
	Female	100	69.4
Age	Under 39	11	7.6
	40~49	23	16.0
	50~59	55	38.2
	60~69	36	25.0
	Over 70	19	13.2
Marriage	Single	4	2.8
	Married	121	84.0
	Divorce	5	3.5
	Separation	3	2.1
	Death and death	11	7.6
Education	Elementary school	19	13.2
	Middle school	39	27.1
	High school	66	45.8
	University	20	13.9
Occupation	Teacher	11	7.6
	Production	5	3.5
	Office	11	7.6
	Sever	13	9.0
	Professional occupation	25	17.4
	Housewife	54	37.5
	Jobless person	17	11.8
	Other	8	5.6
	Total	144	100.0

to maximum 5 years, for 10 months on average. Most had breast cancer (38.9%, 56 subjects) -- partly because there were more female subjects in this study -- followed by gastric cancer (38.9%) and lung cancer (38.9%), and 4 out of 14 subjects with thyroid cancer (9.7%) were men. 59.7% received chemotherapy, most of them were in Stage 1 (61.8%), and all subjects except 29 of them had already received surgical treatment at least once (Table 3).

Interest in forest healing

Multiple-choice questions were used to determine the interest in forest healing among the subjects. 52.1% (75 subjects) went to a mountain or a forest once a week, 14.6% (21 subjects) went once a month, 2.1% (3 subjects) went

Table 3. Clinical characteristics of the study subject

Variable		n	Percent(%)
Cancer types	Thyroid cancer	14	9.7
	Colorectal cancer	10	6.9
	Gastric cancer	12	8.3
	Breast cancer	56	38.9
	Lung cancer	12	8.3
	Liver cancer	8	5.6
	Ovarian cancer	8	5.6
	Various cancer	24	16.7
Unit	1 unit	89	61.8
	2 unit	30	20.8
	3 unit	20	13.9
	4 unit	5	3.5
Chemotherapy	Zero	58	40.3
	One ~ five	46	31.9
	Six ~ ten	30	20.8
	Eleven ~	10	6.9
Surgical treatment	Zero	29	20.1
	One	94	65.3
	Two	21	14.6
Medicine	Not taking	58	40.3
	Taking	86	59.7

once every 3 months, 6.3% (9 subjects) went once every 6 months, 4.2% (6 subjects) went once a year, and 18.1% (26 subjects) almost never went. 87% (120 subjects) claimed to have heard of forest healing, 36.7% (44 subjects) on TV, 33.3% (40 subjects) on the internet, and 17.5% (21 subjects) on SNS, but 79.2% (114 subjects) had no experience participating in forest healing. 82.6% (118 subjects) were willing to participate in a forest healing program, and 9.8% (14 subjects) were not. In a previous study that surveyed the preference of adults in forest healing programs, men were more aware of forest healing than women, and most of whom experienced the programs were in their 50s, followed by 40s, 30s, and 20s (Kim et al., 2014b). 29.9% (43 subjects) responded they preferred spring, 6.9% summer (10 subjects), 27.8% fall (40 subjects), 0.7% winter (1 subjects), and 34.7% responded that the season does not matter (50 subjects). In a previous study, the 20s preferred half a day and a day, and 30s-50s preferred overnight and half a day (Kim et al., 2014b), but in this study, 42.4%

(61 subjects) preferred 1 hour and 30 minutes, 40.3% (58 subjects) preferred 2 hours, and 9.0% (13 subjects) preferred 3 hours. 4.9% (7 subjects) said they want to participate once a month, 38.2% (55 subjects) once a week, 33.3% (48 subjects) twice a week, 7.6% (11 subjects) 3 times a week, 3.5% (5 subjects) 4 times a week, 4.9% (7 subjects) 5 times a week, and 7.6% (11 subjects) every day (Table 4). An analysis on the visitor characteristics of healing forests showed that many visitors are satisfied with 2-4 hours of experience-based programs in the spring, but it is necessary to organize different programs depending on the disease (Kim et al., 2016b). Since satisfaction varies depending on whether one has a disease or not, the needs of the subjects must be reflected in order to create a good program (Lee et al., 2016). Thus, it is necessary to plan and develop specialized programs based on analysis of interests and needs of the subjects in forest healing and train forest therapists with professional knowledge in the programs. In this study, cancer patients had a high level of awareness about forest healing but had relatively little experience in actually participating in a forest healing program, and yet they showed a strong will to participate. Thus, there is a need for forest healing programs that are suitable for the characteristics of cancer patients by determining their needs and preferences to alleviate their psy-

Table 4. Forest healing interest

Variable	Category	n	Percent(%)
Mountain, forest visit	Once a week	75	53.6
	Once a month	21	14.6
	Once in 3 months	3	2.1
	Once in 6 months	9	6.3
	Once a year	6	4.2
	None	26	18.1
Forest healing awareness	Yes	120	87.0
	No	24	13.0
Forest healing cognitive path	Books	3	2.5
	Newspaper	6	5.0
	Magazine	2	1.7
	TV	44	36.7
	SNS	21	17.5
	Acquaintance	40	33.3
	Other	4	3.3

Table 4. (continued)

Variable	Category	n	Percent(%)
Forest healing program experience	Yes	30	20.8
	No	114	79.2
Participation in forest healing program	Yes	65	45.2
	Some intention	54	37.5
	Usually	11	7.6
	Not much	10	6.9
	No	4	2.8
Who wants to participate together	Spouse/Couple	88	61.1
	Children	11	7.6
	Friend	24	16.7
	Alone	18	12.5
	Other	3	2.1
Day of participation	Weekday morning	71	49.2
	Weekday afternoon	15	10.4
	Saturday morning	22	15.3
	Saturday afternoon	5	3.5
	Sunday morning	8	5.6
	Sunday afternoon	3	2.1
	Does not matter	20	13.9
Engagement time	Dawn	4	2.8
	Morning	109	75.7
	Afternoon	17	11.8
	Does not matter	14	9.7
Participating season	Spring	43	29.9
	Summer	10	6.9
	Fall	40	27.8
	Winter	1	0.7
	Does not matter	50	34.7
Program time	1 hour	7	2.7
	1 hour 30 minutes	61	42.4
	2 hours	58	40.3
	2 hour 30 minutes	7	4.9
	3 hours	13	9.0
	Does not matter	1	0.7
Engagements	Once a month	7	4.9
	Once a week	55	38.2
	Twice a week	48	33.3
	3 times a week	11	7.6
	4 times a week	5	3.5
	5 times a week	7	4.9
	Everyday	11	7.6
Total		144	100.0

chological depression, anxiety, and stress and promote quality of life and physical functions. In addition, it is necessary to develop forest healing programs that meet the needs of the subjects according to the four seasons as well as the purpose and characteristics of the program and implement them in the actual scene based on effectiveness studies.

Difference of interest in forest healing depending on gender and cancer types

Difference of interest in forest healing depending on gender

Interest in forest healing (who they want to participate with, number of visits, awareness of forest healing, path of forest healing awareness, intention to participate, desired day of the week, participating time, number of participations, season, gender) showed a significant difference depending on gender. More specifically, most men responded they want to participate with their spouse or lover (81.8%), whereas only 52% of women (52 subjects) responded the same, which showed a significant difference; other than that, there was no significant difference in the items of interest in forest healing (Table 5). In the needs for programs using urban forests, the 20s and 40s highly appreciated forest healing factors, while the 30s and 50s attached greatest importance to forest healing programs, claiming that differentiated programs must be provided depending on the age of participants (Park and Koo, 2018). A previous study stated that by gender, women preferred spring and men preferred fall, and by age, the 20s-30s preferred fall and the 40s-50s preferred spring; and since the sensitivity and emotions of the subjects all vary, the programs cannot be limited to just one season and instead must be differentiated by seasons (Kim et al., 2014b). As such, this study discovered that more women visited the forest than men and also more often, and that the subjects wanted to participate in the programs with their spouses or lovers. Thus, it is necessary to develop a program in which the subjects can participate with their spouses. There was a difficulty in securing the subjects due to the nature of their characteristics, but it seems necessary to conduct a systematic survey on the subjects by cancer types they

are diagnosed with.

Difference of interest in forest healing depending on cancer types

There was a difference of interest in forest healing depending on the name of cancer types. The subjects with colorectal/breast/lung/liver/other types of cancer visited the forest once a week, those with thyroid/ovarian cancer once every 6 months, and those with gastric cancer once a year (Table 6). Those with breast cancer were most aware of forest healing programs, followed by other types of cancer, thyroid cancer, colorectal cancer, gastric cancer, lung/liver cancer, and ovarian cancer (Table 7). 45.1% (breast cancer, other types of cancer, lung cancer, colorectal/lung cancer, thyroid/gastric cancer, ovarian cancer) showed the intention to participate in the program, but 17.4% (breast cancer, gastric/lung/other types of cancer, lung cancer) did not (Table 8). For participation, 59.7% (breast cancer, other types of cancer, lung cancer, thyroid/colorectal cancer, gastric cancer, ovarian cancer, lung cancer) preferred mornings (49.3%) and afternoons (10.4%) on weekdays, 18.8% (breast cancer, thyroid/gastric cancer, colorectal/lung/other types of cancer, ovarian cancer) preferred Saturday mornings (15.3%) and afternoons (3.5%), and 7.7% (breast cancer, thyroid cancer, lung/other types of cancer) preferred Sunday mornings (5.6%) and afternoons (2.1%) (Table 9). The subjects with breast cancer, other types of cancer, thyroid cancer, colorectal/gastric cancer, ovarian cancer, and lung/liver cancer wanted to participate in the morning (Table 10). According to previous studies, it is necessary to develop programs that can increase the duration and desire to produce effects through forest activities depending on the characteristics of the subjects (Kim et al., 2015b), develop regular programs considering the characteristics of the subjects within 1-2 hours rather than non-regular programs depending on subjects, patterns, and operating method (Son et al., 2012), and subdivide the subjects according to the diagnosis by training experts in the relevant fields (forest health, forest exercise, forest experience in medicine, healthcare, nursing) (Hong and Lee, 2018). In this study, cancer patients showed a strong intention to participate in forest healing programs, and they tended to prefer mornings on

Table 5. Differences in preference for forest healing programs according to gender

	Spouse/lover	Children	Fiend	Alone	Etc.	Total	χ^2	<i>p</i>
Male	36(81.8)	2(4.5)	2(4.5)	3(6.8)	1(2.3)	44	12.47	.014
Female	52(52.0)	9(9.0)	22(22.0)	15(15.0)	2(2.0)	100		
Total	88	11	24	18	3	144(100)		

Table 6. Differences in frequency of visits to mountains or forests according to cancer types

Mountain, forest visit	Once a week	Once every 6 months	Less than once a year	Total	χ^2	<i>p</i>
Thyroid cancer	1(7.1)	9(64.3)	4(28.6)	14	32.06	.004
Colorectal cancer	4(57.1)	0(0)	3(42.9)	7		
Gastric cancer	4(33.3)	3(25.0)	5(41.7)	12		
Breast cancer	37(67.3)	8(14.5)	10(18.2)	55		
Lung cancer	5(41.7)	3(25.0)	4(33.3)	12		
Liver cancer	6(75.0)	1(12.5)	1(12.5)	8		
Ovarian cancer	3(37.5)	4(50.0)	1(12.5)	8		
Various cancer	15(62.5)	5(20.8)	4(16.7)	24		
Total	75(53.6)	33(23.6)	32(22.9)	141(100)		

Table 7. Differences in the perception of forest healing according to cancer types

Forest healing awareness	Acquaintance	Do not know	Total	χ^2	<i>p</i>
Thyroid cancer	14(100)	0(0)	14	18.01	.012
Colorectal cancer	10(100)	0(0)	10		
Gastric cancer	10(90.9)	1(9.1)	11		
Breast cancer	50(90.9)	5(9.1)	55		
Lung cancer	7(58.3)	5(41.7)	12		
Liver cancer	7(87.5)	1(12.5)	8		
Ovarian cancer	6(100)	0(0)	6		
Various cancer	16(72.7)	6(27.3)	22		
Total	120(87.0)	18(13.0)	138(100)		

Table 8. Differences in participating in forest healing according to cancer types

Foreat healing program	Yes	Is average	Not rally	Total	χ^2	<i>p</i>
Thyroid cancer	4(28.6)	10(71.4)	0(0)	14	31.29	.005
Colorectal cancer	5(50.0)	5(50.0)	0(0)	10		
Gastric cancer	4(33.3)	4(33.3)	4(33.3)	12		
Breast cancer	24(42.9)	21(37.5)	11(19.6)	56		
Lung cancer	7(58.3)	1(8.3)	4(33.3)	12		
Liver cancer	5(62.5)	1(12.5)	2(25.0)	8		
Ovarian cancer	1(12.5)	7(87.5)	0(0)	8		
Various cancer	15(62.5)	5(20.8)	4(16.7)	24		
Total	65(45.1)	54(37.5)	25(17.4)	144(100)		

Table 9. Differences in the desired day of the week to participate in forest healing according to cancer types

Day of participation	Weekday		Saturday		Sunday		Does not matter	Total	χ^2	p
	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon				
Thyroid cancer	7(50.0)	1(7.1)	3(21.4)	0(0)	2(14.3)	0(0)	1(7.1)	14	59.68	.038
Colorectal cancer	7(70.0)	0(0)	2(20.0)	0(0)	0(0)	0(0)	1(10.0)	10		
Gastric cancer	5(41.7)	1(8.3)	3(25.0)	0(0)	0(0)	0(0)	3(25.0)	12		
Breast cancer	21(37.5)	7(12.5)	9(16.1)	5(8.9)	4(7.1)	2(3.6)	8(14.3)	56		
Lung cancer	2(16.7)	6(50.0)	2(16.7)	0(0)	1(8.3)	0(0)	1(8.3)	12		
Liver cancer	8(100)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	8		
Ovarian cancer	4(50.0)	0(0)	1(12.5)	0(0)	0(0)	0(0)	3(37.5)	8		
Various cancer	17(70.8)	0(0)	2(8.3)	0(0)	1(4.2)	1(4.2)	3(12.5)	24		
Total	71(49.3)	15(10.4)	22(15.3)	5(3.5%)	8(5.6%)	3(2.1%)	20(13.9)	144(100)		

Table 10. Differences in the desired time for participating in forest healing according to cancer types

Engagement time	Dawn	Morning	Afternoon	Does not matter	Total	χ^2	p
Thyroid cancer	0(0)	12(85.7)	0(0)	2(14.3)	14	49.36	.000
Colorectal cancer	0(0)	9(90.0)	1(10.0)	0(0)	10		
Gastric cancer	1(8.3)	9(75.0)	0(0)	2(16.7)	12		
Breast cancer	1(1.8)	41(73.2)	9(16.1)	5(8.9)	56		
Lung cancer	0(0)	6(50.0)	6(50.0)	0(0)	12		
Lliver cancer	2(25.0)	6(75.0)	0(0)	0(0)	8		
Ovarian cancer	0(0)	8(100)	0(0)	0(0)	8		
Various cancer	0(0)	18(75.0)	1(4.2)	5(20.8)	24		
Total	4(100)	109(100)	17(100)	14(100)	144(100)		

weekdays. In further research, it is necessary to reclassify the patients by type of cancer and analyze their interest, preference, and needs to develop and implement scientific, systematic, sustainable, and regular forest healing programs based on the interest and healing factors, thereby ultimately improving the quality of the forest healing programs for cancer patients.

Preference in forest healing program

The forest healing program most preferred by cancer patients was kinesiology ($M = 4.39$), followed by climate/water therapy ($M = 4.11$), diet therapy ($M = 3.78$), psychotherapy ($M = 3.76$), and plant therapy ($M = 3.45$). The most preferred activity in kinesiology was walking through the forest ($M = 4.47$), forest exercises ($M = 4.35$), and laughter exercises ($M = 4.22$). In climate therapy, it was forest bathing ($M = 4.38$), followed by natural meditation ($M = 4.26$)

and wind bathing ($M = 4.22$). In water therapy, the most preferred activity was anion bathing ($M = 4.02$) and water sound listening and meditation ($M = 3.85$). In diet therapy, the subjects most preferred drinking tea ($M = 4.32$) and cooking with plants. In psychotherapy, the most preferred activity was abdominal breathing ($M = 4.23$), followed by lymphatic massage ($M = 4.13$), and body scan ($M = 3.75$) (Table 11). Activities in forest healing are classified by movement (static-dynamic), place (indoors-outdoors), five senses, therapy (plant, kinesiology, climate, psychotherapy, diet, water), and subject (general, chronic, environmental, toxic), but to actually apply them, it is necessary to develop programs depending on the diagnosis (Kim et al., 2019). Healing factors are classified into physical (water, sunlight, topography), chemical (phytoncide, anionic oxygen), sensory (sound, fragrance, taste, touch), and sociopsychological factors, and physical, physiological, sensory, and mental communion through forest healing factors promote physical

Table 11. Forest healing program preference

Program	Mean	SD	Min.
Psychotherapy	3.76	.76	1.00
Double breathing	4.23	1.02	1.00
Lymph massage	4.13	1.22	1.00
Body scan	3.75	1.11	1.00
Sharing empathy	3.56	1.09	1.00
Recall therapy	3.11	1.20	1.00
Kinesiology	4.39	.66	2.00
Forest, mountain walk	4.47	.82	1.00
Forest gymnastics	4.35	.88	1.00
Laughter movement	4.22	.91	1.00
Band exercise	3.39	1.08	1.00
Music rhythmic gymnastics	3.78	1.07	1.00
Nordic walking	3.18	1.18	1.00
Climate therapy	4.11	.77	1.00
Forest bathing	4.38	1.00	1.00
Natural meditation	4.26	.94	1.00
Wind bath	4.22	1.05	1.00
Aromatherapy	4.03	1.04	1.00
Nap	3.65	1.14	1.00
Plant therapy	3.45	.86	1.14
Landscape view	3.99	1.08	1.00
Forest horticulture treatment	3.88	1.12	1.00
Plant observation	3.56	1.19	1.00
Gardening	3.50	1.21	1.00
Making natural objects	3.15	1.09	1.00
Dyeing natural products	3.09	1.17	1.00
Listen to the plant lecture	2.94	1.31	1.00
Water therapy	4.11	.85	1.67
Anion bath	4.02	1.13	1.00
Water meditation/the sound	3.85	1.17	1.00
Water cannon/water play	2.81	1.21	1.00
Diet therapy	3.78	.93	1.00
Drinking tea	4.32	.83	1.00
Plant cooking	3.70	1.24	1.00
Food therapy	3.33	1.28	1.00

and mental health (Kim et al., 2008). Activities that men and women most preferred in urban forests were forest bathing, wind bathing, and sunbathing, as well as looking at the natural landscape (Park and Koo, 2018). In this study, by developing and implementing a forest healing program that is suitable for the disease and characteristics of cancer

Table 12. Differences in preference for forest healing programs according to gender

Variable	Group	n	M	t(p)
Diet therapy	Male	44	3.45	-2.96**
	Female	100	3.93	(.004)

** $p < .01$.

patients using forest healing factors of kinesiology, climate therapy, water therapy, psychotherapy, and plant therapy preferred by cancer patients, it would be possible to provide effective programs for cancer patients with a high level of satisfaction.

Difference of preference in forest healing depending on gender and cancer types

As a result of conducting an independent samples t-test to verify the difference of preference in forest healing program by gender, it was found that there was a significant difference in diet therapy by gender ($t = -2.96$, $p < .01$). Women more preferred diet therapy than men, whereas there was no significant difference in psychotherapy, kinesiology, climate therapy, plant therapy, and water therapy (Table 12). There was also no significant difference of preference in forest healing program by cancer types. The healthy group of subjects preferred a sensitive approach using five senses depending on their stress level, whereas the risk group required help from specialists with a cognitive (lecture, counseling, coaching) approach (Kim, 2016a). In urban forests, participants preferred forest bathing, wind bathing, meditating, listening to the water, and foot bathing. Their biggest purpose of participation was to refresh themselves, relax, and promote health. Most men and women most preferred forest healing factors and attached great importance to forest healing programs and instructors (Park and Koo, 2018). In this study, female respondents preferred diet therapy. In further research, it is necessary to accurately determine the preferences of male and female cancer patients and scientifically develop and implement forest healing programs for each therapy based on advice from specialists (forest health, forest exercise, forest experience in medicine, healthcare, nursing), depending on the characteristics of the subjects.

Preference in the purpose of forest healing programs

For the purpose of participating in forest healing programs, the subjects most preferred the psychological ($M = 4.26$) domain, followed by physical ($M = 3.76$), social ($M = 3.68$), and cognitive ($M = 3.64$) domains. They had high expectations for relieving anxiety and depression through forest healing programs in the psychological aspect, relieving pain in the physical aspect, improving leisure in the social aspect, and improving concentration and sensory perception ability in the cognitive aspect, but there was no significant difference of preference in the purpose of forest healing programs by gender and cancer types (Table 13). To promote mental healing through social, psychological, and physical adaptability using plants, it is necessary to subdivide the aspects into emotional, social, cognitive, and physical domains depending on the subjects, purpose, and place, which are promoted by interactions (Relf, 1998). Depending on the stress level, the healthy group preferred walking in the forest, listening to the water, and experiencing the five senses, whereas the high-risk stress group pre-

ferred cognitive programs such as lectures, counseling, and coaching (Kim, 2016a). Among factors that affect psychosocial adaptation of cancer patients, stress has a direct effect; thus, not only the process of curing cancer but also psychosocial adaptation to coping with the process is important (Oh and Jang, 2014). To increase the therapeutic effects for cancer patients, it is necessary to first develop forest healing programs that meet the purpose of the treatment by reflecting the specificity of cancer types. Cancer patients need forest healing programs that can promote both their psychological stability and physical health, which requires systematic and scientific verification and analysis on the cancer types that the subjects are diagnosed with as well as the symptoms.

Conclusion

This study was conducted to develop and implement differentiated forest healing programs by analyzing the preferences and needs of cancer patients and increase the effects of the programs. Thus, we conducted a self-administered survey from October 2018 to April 2019 on the subjects diagnosed with cancer. The sample size ($n = 144$) was the appropriate size required by G-Power, and the retrieved responses were analyzed using SPSS 25.0. 87% (120 subjects) were aware of forest healing programs, most of them from TV, followed by the internet and SNS. 79.2% (114 subjects) did not have experience participating in a forest healing program, but 82.6% (118 subjects) had intention to participate. This indicates that even though not many of them have experience participating in forest healing, they showed high interest and needs for participation. They preferred to participate in spring (29.9%) and fall (27.8%), in programs carried out for 1.5-2 hours in the morning on weekdays, which suggests the need to develop various programs using forests in the four seasons. In the needs for forest healing programs, the subjects most preferred kinesiology, followed by climate therapy and water therapy, then diet therapy, psychotherapy, and plant therapy. Exercise programs for cancer patients will help lower their depression and increase resilience through engagement in nature as well as various physical and emotional activities. Moreover,

Table 13. Preference for forest healing programs

Program	Mean	SD	Min.
Physical domain	3.76	.94	1.00
Body function	4.19	1.05	1.00
Pain relief	3.94	1.17	1.00
Relieve gastrointestinal symptoms	3.64	1.25	1.00
Relieve vomiting symptoms	3.26	1.19	1.00
Psychological domain	4.26	.79	1.00
Depression	4.43	.88	1.00
Relief of anxiety	4.29	1.00	1.00
Improve emotion control	4.17	.95	1.00
Improved self-esteem	4.15	1.00	1.00
Social domain	3.68	.75	1.00
Improve leisure	4.15	.87	1.00
Improve interpersonal skills	3.81	1.01	1.00
Improve communication skills	3.74	.99	1.00
Job skills improvement	3.04	1.07	1.00
Cognitive domain	3.64	.89	1.00
Improve concentration	3.96	1.02	1.00
Sensory perception	3.65	1.08	1.00
Improve problem solving	3.51	1.04	1.00
Improve your vocabulary	3.44	1.09	1.00

subjective, direct activities in the physical environment of a forest will have positive effects on improving the physiological functions and lifting the mood. For the purpose of participation, the subjects most preferred the psychological domain, followed by physical, social, and cognitive domains. This indicates that, although this study is limited as it is conducted on 144 cancer patients without enough male respondents, surveying the needs and purposes of cancer patients is significant in that it has raised the need for continuous research on development and implementation of forest healing programs. Furthermore, developing manuals from implementation of forest healing programs is an inevitable task to improve the effects of forest healing. This study failed to classify many cancer types for statistics as it was difficult to obtain a greater sample size due to the nature of the subjects, and thus it is necessary to conduct a more systematic survey by classifying the diagnosis. Further research must provide ways to plan, develop, and implement differentiated forest healing programs considering the psychological and physical characteristics of cancer patients as well as the natural environment. It is first necessary to develop forest healing programs that meet the therapeutic purposes based on surveys on the needs and purposes of the programs according to the classification of diagnosis for the five main types of cancer (gastric cancer, colorectal cancer, liver cancer, breast cancer, cervical cancer) in the national cancer policy. There is also a need to plan forest healing program that can promote both psychological stability and physical health of cancer patients and verify and evaluate their effects based on specialized training of forest healing instructors.

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