An Analysis of Needs for Forest Therapy Programs for Subfertile Women

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ABSTRACT

The purpose of this study was to investigate 199 subfertile women's interest in and needs for forest therapy programs according to their demographic characteristics in a subfertile clinic in Seoul to provide basic data. The results of this study were summarized as follows. First, the perception and experience of subfertile women about forest therapy were all low, but their intention to participate was generally positive. Second, the type of forest therapy preferred by subfertile women was a half-day small group that they can participate with their spouse during weekends. Third, subfertile women expected phytoncide (35.8%) and a high level of oxygen (29.9%) from forest therapy programs. Fourth, subfertile women expected physical and mental health such as improved blood circulation and immunity, and meditation opportunity from forest therapy. Fifth, subfertile women expected from forest therapists understanding and sympathy (62.2%). This study conducted a survey on 199 subfertile women only. Through follow-up studies that involve more subfertile subjects and a broader region, it will be possible to develop more effective forest therapy programs for promoting the physical and mental health of subfertile subjects.

Keywords: basic data, forest therapy factors, mental and physical health

Introduction

The number of women who were diagnosed with subfertility has steadily increased over the past decade in South Korea, and the number of subfertile couples has reached at least 600,000 today (Hwang et al., 2015). As subfertility has been recognized as a serious social issue, the government introduced the Program for Supporting Subfertile Couples as a childbirth incentive in 2006, and has supported medical expenses for assisted reproductive procedures. In addition, procedures for subfertility that used to be non-payment items including artificial insemination and external fertilization started to be covered from July, 2019.

However, most of the support programs that are currently available for subfertile couples focus on financial

support for 'medical procedures' only, and many studies pointed out that other types of difficulties and hardships that subfertile women experience in reality from physical, psychological, relational and cognitive perspectives have been overlooked (Devine, 2003; Hwang, 2011; Miles, 2005; Peterson et al., 2007; Yong et al., 2000). It has been reported that subfertile women experience various physical symptoms such as sleep disorders, loss of appetite, headache and chronic fatigue, and other issues such as a sense of guilt, self-degradation, a sense of inferiority, anxiety, a high level of stress from subfertility and depression, and another study pointed out that the level of stress that subfertile women experience is similar to that of cancer patients (Domar et al., 1993). Subfertile women also have psychological issues associated with becoming a mother,

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womanhood, a sense of loss, sadness and relational problems (Lindsey and Driskill, 2013), and experience stress from procedures, a sense of control, being branded as a woman who are unable to give birth and difficulties in performing adulthood development tasks. It was reported that stress from subfertility reduces pregnancy rates, and is associated with discontinuing subfertility treatment (Cousineau and Domar, 2007).

Forest therapy is a method of feeling physical and mental comfort in a stressful life (Kim, 2006; Yoo and Jeong, 2009) through connections with the vitality of nature (Maller et al., 2006) by utilizing factors of forest therapy (Kim, 2006; Park, 2010; Yoo and Jeong, 2009). It means a series of activities led by forest therapy instructors (Kim, 2015) that improve immunity, prevent diseases and promote health by improving, maintaining and restoring quality of life from mental, social, physical, cognitive and spiritual perspectives (Park, 2010). When people are nervous under stress, the sympathetic nervous system is activated and induces negative feelings. When such situations last longer, cardiovascular diseases are easily caused and immunity is reduced. It was recently reported that slow activities such as walking in forest and forest experiences were effective for reducing tension and calling attention (Woo, 2014) and that the brainwaves, blood pressure and pulse of the body are relaxed and stabilized, and stress is reduced after a forest bath (Lee and Lee, 2013). Spending time in natural spaces like forests itself is also known to reduce physiological stress (Chang and Chen, 2005; Hartig et al., 1991; Ulrich et al., 1991; van Den Berg and Custers, 2011), and activities such as looking at surrounding landscapes in forest or walking along forest trails are known to make people subjectively feel a sense of relaxation and activate the functions of the parasympathetic nervous system (Tsunetsugu et al., 2007). Another study also reported that the higher the percentage of looking at green colors, the higher resilience from stress (Lee, 2007). These results indicate that the therapeutic effects of forest therapy can be utilized to address various difficulties that subfertile women experience from physical, psychological, emotional, cognitive and social perspectives such as stress and depression.

Customized activities for forest therapy programs need to be developed in the planning stage through a thorough

analysis of participants (Lee and Kim, 2011; Seok and An, 2013). There are several earlier studies that analyzed consumers' needs for forest therapy for developing forest therapy programs such as analysis of people's interest in and needs for the development of forest therapy programs for adults (Kim et al., 2014) and analysis of urban forest users (Park and Koo, 2018). However, there has been only few studies on forest therapy programs for subfertile women. This study aimed to analyze the needs of subfertile women who came to a fertility clinic in Seoul for forest therapy programs depending on their demographic characteristics, and to provide basic data for developing and executing forest therapy programs for the promotion of the physical and mental health of subfertile women.

Research Methods

Subjects and methods

A written questionnaire survey was conducted in a fertility clinic in Seoul for 19 days from January 21, 2019 to February 8, 2019. Subjects were selected using a convenience sampling method. Researchers visited the clinic, and explained the purpose of this study to women who were waiting for diagnosis of and treatment for subfertility. Questionnaire sheets were distributed to those who agreed to participate in this study and were collected on the spot. A total of 210 questionnaire sheets were collected, and 11 sheets that did not sufficiently answer were excluded. As a result, a total of 199 sheets were analyzed.

Composition of questionnaire questions about needs for programs

In order to survey subfertile women's needs for forest therapy programs in Korea, a questionnaire composed of a total of 31 questions was developed using the content of questionnaires used in related studies in Korea (Kang, 2015; Kim, 2015; Kim et al., 2011) as follows: 12 questions on the demographic characteristics of subfertile women; one question on awareness of forest therapy; two questions on experience of forest therapy programs; four questions

Table 1. Survey contents

Contents	Category		Number of questions	
Demographic	Age, spouse age, marriage duration, education, spouse education, occupation, spouse occupation, monthly income, religion, family member living together		12	
Forest therapy program for subfertile women	Awareness of forest therapy	1. Knowledge about forest therapy	19	
	Experience of participation in forest therapy program	2. Experience of participation in forest therapy programs		
		3. Frequency of visiting forests		
		4. Desire for forest therapy program participation		
	Intention to participate in forest therapy program	5. Reasons for not participating in forest therapy program		
		6. Appropriate number of forest therapy program participants		
		7. Companion of participation in forest therapy program		
		Preference for forest therapy programs		8. Duration of forest therapy program
				9. Preferred day of forest therapy program
	10. Need for a forest therapy program for couples			
	11. Duration of therapy program for infertile couples			
	12. Qualifications for the forest therapists			
	Purpose of participation	13. Preferred forest type		
		14. Preferred forest location		
		15. Preferred forest program space		
		16. Forest factors to help		
		17. Physical effects of forest therapy		
		18. Psychological effects of forest therapy		
		19. Self-help group effects of forest therapy		
Total			31	

on intention to participate in forest therapy programs; eight questions on preference for forest therapy programs; and four questions on purpose of participation (Table 1). This questionnaire was reviewed by one subfertility counselor and one forest therapist.

Data analysis

Data collected in this study were analyzed using SPSS 21.0 for window (SPSS Inc., Chicago, Illinois, USA), and the demographic characteristics of subjects were analyzed using frequency analysis. Cross tabulation analysis was conducted to analyze subfertile women's needs for forest therapy programs depending on their demographic characteristics.

Results and Discussion

Demographic characteristics

The demographic characteristics of subjects are as shown

in Table 2. They had an experience of subfertility treatment, and had no child. Their age ranged from 23 to 50, and the number of those aged between 35 and 39 was the highest (79, 39.7%), followed by those aged between 30 and 34 (58, 29.1%) and those aged over 40 (55, 27.6%). The number of those whose spouses were aged over 40 was 86 (43.2%), and that of those aged between 35 and 39 was 73 (36.7%). The number of those who were married for 5-10 years was the highest (52, 26.1%), followed by 3-5 years (51, 25.6%), and 1-2 years (37, 18.6%). In terms of academic background, the number of university graduates was the highest (116, 58.3%), followed by high school graduates or lower (27, 13.6%), and graduate school and 2-year college graduates (28, 14.1%) respectively. The number of their spouses who were university graduates was the highest (123, 61.8%), followed by graduate school graduates (27, 13.6%), high school graduates or lower (26, 13.1%), and 2-year college graduates (23, 11.6%). In terms of occupation, the number of housewives was the highest (74, 37.2%), followed by professional workers (47, 23.6%),

Table 2. Demographic characteristics of respondents (N = 199)

Variable	Category	n	%
Age	20-29 years	7	3.5
	30-34 years	58	29.1
	35-39 years	79	39.7
	Over 40	55	27.6
Age of spouse	20-29 years	4	2.0
	30-34 years	36	18.1
	35-39 years	73	36.7
	Over 40	86	43.2
Marriage duration	Less than 1 year	9	4.5
	1-2 years	37	18.6
	2-3 years	36	18.1
	3-5 years	51	25.6
	5-10 years	52	26.1
	More than 10 years	14	7.0
Education	High school graduate	27	13.6
	2-year college graduate	28	14.1
	College graduates	116	58.3
	Graduate school	28	14.1
Education of spouse	High school graduate or lower	26	13.1
	2-year college graduate	23	11.6
	College graduate	123	61.8
	Graduate school	27	13.6
Occupation	Housewife	74	37.2
	Service	15	7.5
	Office work	45	22.6
	Self-employed / Sales	10	5.0
	Technical	8	4.0
	Profession	47	23.6
Occupation of spouse	Unemployed	3	1.5
	Service	9	4.5
	Office work	69	34.7
	Self-employed / Sales	32	16.1
	Technical	30	15.1
	Profession	56	28.1
Total monthly income (KRW)	Less than 2,000,000	7	3.5
	2,001,000 - 3,000,000	20	10.1
	3,001,000 - 4,000,000	29	14.6
	4,001,000 - 4,000,000	42	21.1
	More than 5,000,000	101	50.8
Religion	None	90	45.2
	Christian	49	24.6
	Catholic	29	14.6
	Buddhism	28	14.1
	Others	3	1.5

Table 2. (continued)

Variable	Category	n	%
Family member living together	Spouse only	191	96.0
	Parents	6	3
	Parents-in-law	1	0.5
	Spouse's sibling	1	0.5
The spouse's birth order among brothers	First	92	46.2
	Second or more	38	19.1
	Youngest	51	25.6
	Only-child	18	9.0
Residence	Seoul	144	72.4
	Gyeonggi-do	37	18.6
	Chungcheong-do	4	2.0
	Kyongsang-do	8	4.0
	Jeolla-do	4	2.0
	Gangwon-do	2	1.0
	Jeju-do	2	1

office workers, service workers, self-employed/sales workers and technical workers. The number of those whose spouses were office workers was the highest (69, 34.7%), followed by professional workers (56, 28.1%), self-employed/sales workers (32, 16.1%), technical workers (30, 15.1%), service workers (9, 4.5%), and unemployed (3, 1.5%). The number of those whose monthly family income was over 5,001,000 won or higher was the highest (101, 50.8%), followed by 4,001,000-5,000,000 won (42, 21.1%), 3,001,000-4,000,000 won (29, 14.6%), 2,001,000-3,000,000 won (20, 10.1%), and 2,000,000 won or lower (7, 3.5%). In terms of religion, the number of those who had no religion was the highest (90, 45.2%), followed by Christianity, Catholicism, Buddhism and others. Most of the subjects were surveyed to live with their spouse (191, 96.0%). The birth order of their spouses among brothers was also surveyed, and the number of those who were the first child was the highest (92, 46.2%) and 18 spouses (9.0%) were an only-child. The number of those who lived in Seoul was the highest (144, 72.4%), followed by Gyeonggi-do, Gyeongsang-do, Chungcheong-do and Jeolla-do and Gangwon-do.

Analysis of subfertile women's needs for forest therapy programs depending on their demographic characteristics

Awareness and experience of forest therapy

Subfertile women's awareness of forest therapy was surveyed, and the majority of the surveyed women were not aware of forest therapy (75.4%), and 24.6% answered that they heard about forest therapy (Table 3). In addition, 96.5% answered that they had no experience of forest therapy programs, which was partially different from the results of Kim (2015) that analyzed people's interest in and needs for forest therapy programs for adults and those of Park and Koo (2018) that analyzed people's needs for developing forest therapy programs that utilize urban forests. The two earlier studies reported that people's awareness of forest therapy was high while the number of those who had experience was low. In this study, however, subfertile women were found to be less aware and have less experience of forest therapy. Park (1993) reported that emotional depression that subfertile women experienced gradually led to isolation from social relations including marital relations, family members, friends and neighbors. These results seem to be associated with their very low exposure to information on forest therapy programs. This increases the necessity for pro-

moting the effects of forest therapy in a more active manner by targeting subfertile women considering their withdrawn emotional and socio-relational conditions. Table 4 shows their awareness by age group, and 32.7% of those aged over 40 answered that they heard about forest therapy. The percentage of those aged between 30 and 34 was the lowest (12.1%, $p=.043$)

Frequency of visiting forests

The frequency of visiting forests was surveyed (Table 5), and 47.7% answered that they hardly visited forests. Visiting

forests more than once a year was 20.6%, followed by more than once a quarter (17.6%), more than once a month (8.5%), and more than once a week (5.5%) (Table 3). By academic background, 59.3% of high school graduates, 82.1% of 2-year college graduates, 36.2% of university graduates, and 50.0% of graduate school graduates answered that they hardly visited forests, and 11.1% of high school graduates, 3.6% of 2-year college graduates, 4.3% of university graduates, and 7.1% of graduate school graduates answered that they visited forests more than once a week. In addition, 3.7% of high school graduates, 3.6% of 2-year college

Table 3. Forest therapy program awareness and participation of subfertile women (N = 199)

Variable	Category	n	%
Awareness of forest therapy	Known	49	24.6
	Not known	150	75.4
Participation experience of forest therapy program	Some	7	3.5
	None	192	96.5
Frequency of visiting forests	More than once a week	11	5.5
	More than once a month	17	8.5
	More than once a quarter	35	17.6
	More than once a year	41	20.6
	None	95	47.7
Desire for forest therapy program participation	Strongly agree	20	10.1
	Slightly agree	53	26.6
	Neutral	79	39.7
	Slightly disagree	38	19.1
	Strongly disagree	9	4.5
Reasons for not participating in forest therapy program	Busy	122	61.3
	Cost	11	5.5
	Unwilling	38	19.1
	Weakness of body	3	1.5
	Unhelpful	25	12.6

Table 4. Forest therapy program awareness in subfertile women by age

Category	Frequency (%)			$\chi^2(p)$
	Known	Not known	Total	
20-29 years	1(14.3)	6(85.7)	7(100.0)	8.133 (.043*)
30-34 years	7(12.1)	51(87.9)	58(100.0)	
35-39 years	23(29.1)	56(70.9)	79(100.0)	
Over 40	18(32.7)	37(67.3)	55(100.0)	
Total	49(24.6)	150(75.4)	199(100.0)	

* $p < .05$ by Chi square test.

graduates, 10.3% of university graduates, and 10.7% of graduate school graduates answered that they visited forests more than once a month, and 18.5% of high school graduates, 7.1% of 2-year college graduates, 21.6% of university graduates, and 10.7% of graduate school graduates answered that they visited forests more than once a quarter. It was found that 7.4% of high school graduates, 3.6% of 2-year college graduates, 27.6% of university graduates, and 21.4% of graduate school graduates visited forests more than once a year ($p = .063$).

Intention to participate in forest therapy programs for subfertile women and reasons for nonparticipation

To the question about intention to participate in forest therapy programs for subfertile women, the number of those who answered neutral was the highest (39.7%), followed by agree (26.6%) and strongly agree (10.1%), which indicates that most of the subjects showed positive intentions (Table 3). To the question about reasons for nonparticipation, the number of those who answered that they had no time was the highest (61.3%), followed by trouble-

some (19.1%), and the results differed depending on the academic background of respondents (Table 6). To the question, 23.1% of high school graduates or lower picked financial reasons, and 78.3% of college graduates, 59.3% of university graduates, and 70.4% of graduate school graduates answered that they had no time ($p = .008$).

Desired number of participants in forest therapy programs for subfertile women

The number of those who answered that the desired number of participants in forest therapy programs for subfertile women was 2-5 (46.7%), followed by 6-10 (45.2%) (Table 7). These results coincided with the results of Kim (2015) that analyzed needs for developing forest therapy programs.

Desired persons to participate in forest therapy programs with

To the question about persons who subjects desired to participate in programs with, the number of those who answered their spouse was the highest (70.4%), followed by

Table 5. Frequency of visiting forests in subfertile women by education

Category	Frequency(%)					Total	$\chi^2(p)$
	More than once a week	More than once a month	More than once a quarter	More than once a year	None		
High school graduate	3(11.1)	1(3.7)	5(18.5)	2(7.4)	16(59.3)	27(100.0)	27.777 (.006**)
2-year college graduate	1(3.6)	1(3.6)	2(7.1)	1(3.6)	23(82.1)	28(100.0)	
College graduate	5(4.3)	12(10.3)	25(21.6)	32(27.6)	42(36.2)	116(100.0)	
Graduate school	2(7.1)	3(10.7)	3(10.7)	6(21.4)	14(50.0)	28(100.0)	
Total	11(5.5)	17(8.5)	35(17.6)	41(20.6)	95(47.7)	199(100.0)	

** $p < .01$ by Chi square test.

Table 6. Reasons for nonparticipation in forest therapy program in subfertile women by education

Category	Frequency (%)					Total	$\chi^2(p)$
	Busy	Cost	Unwilling	Weakness	Unhelpful		
High school graduate	12(16.2)	6(23.1)	4(15.4)	1(3.8)	3(11.5)	26(100.0)	26.794 (.008**)
2-year college graduate	18(78.3)	0(0)	2(8.7)	0(0)	3(13.0)	23(100.0)	
College graduate	73(59.3)	5(4.1)	26(21.1)	1(0.8)	18(14.6)	123(100.0)	
Graduate school	19(70.4)	0(0)	6(22.2)	1(3.7)	1(3.7)	27(100.0)	
Total	122(61.3)	11(5.5)	38(19.1)	3(1.5)	26(12.6)	199(100.0)	

** $p < .01$ by Chi square test.

Table 7. Desired forest therapy program requirements for subfertile women (N = 199)

Variable	Category	n	%
Reasonable number of participants in forest therapy program	1 person	5	2.5
	2-5 people	93	46.7
	6-10 people	90	45.2
	11-15 people	10	5.0
	15 or more	1	0.5
Companion of participants in forest therapy program	Spouse	140	70.4
	Friends	6	3.0
	Subfertile women	33	16.6
	Alone	20	10.1
Duration of forest therapy program for subfertile women	Once a week, 120 minutes per session, total 8 sessions	123	61.8
	once a week, 120 minutes per session, total 12 sessions	45	22.6
	Once a week, 180 minutes per session, total 12 sessions	5	2.5
	Twice a week, 120 minutes per session, total 16 sessions	7	3.5
	Twice a week, 180 minutes per session, total 16 sessions	2	1.0
	Other	17	8.5
Preferred day of forest therapy program	Weekdays	38	19.1
	Saturdays	84	42.2
	Sundays	107	54.9
	Any time	46	23.1
Need of forest therapy program for subfertile couples	Yes	92	46.2
	No	107	53.8
Duration of forest therapy program for subfertile couples	Half day (morning or afternoon)	77	38.7
	A day	39	19.6
	1 night 2 days	29	14.6
	2 nights 3 days	2	1.0
	3 nights 4 days	1	0.5
	Within a week	2	1.0
	No answer	49	24.6

acquaintances who experienced subfertility (16.6%), alone (10.1%), and friends (3.0%) (Table 7). These results were similar to the results of Kim (2015) and Park and Koo (2018) that the number of subjects who answered family members was the highest. The results differed depending on the monthly family income and family members who subjects lived together with (Table 8). Out of those whose monthly family income was less than 2 million won, 28.6% answered that they wanted to participate with friends, and 65.0% of those whose monthly family income was 2,001,000-3,000,000 won answered their spouse. It was also found that 69.0% of those whose monthly family income was 3,001,000-4,000,000 won, 64.3% of those whose

monthly family income was 4,001,000-5,000,000 won, and 74.3% of those whose monthly family income was over 5,000,000 won answered their spouse ($p = .019$). Out of those who lived with their spouse only, 72.3% answered they wanted to participate with their spouse, and 33.3% of those who lived with their parents together wanted to participate with their spouse or acquaintances respectively. It was found that 100% of those who lived with their parents-in-law answered that they wanted to participate alone, and that 100% of those who lived with their spouse's siblings answered that they wanted to participate with acquaintances.

Table 8. Desired subfertile women's companion in forest therapy program by income and family member living together

Category	Frequency(%)					$\chi^2(p)$
	Spouse	Friend	Acquaintance	Alone	Total	
Total monthly income (KRW)						
2,000,000 or less	5(71.4)	2(28.6)	0(0)	0(0)	7(100.0)	24.138 (.019*)
2,001,000-3,000,000	13(65.0)	0(0)	3(15.0)	4(20.0)	20(100.0)	
3,001,000-4,000,000	20(69.0)	1(3.4)	4(13.8)	4(13.8)	29(100.0)	
4,001,000-5,000,000	27(64.3)	1(2.4)	11(26.2)	3(7.1)	42(100.0)	
Over 5,000,000	75(74.3)	2(2.0)	15(14.9)	9(8.9)	101(100.0)	
Total	140(70.4)	6(3.0)	33(16.6)	20(10.1)	199(100.0)	
Family member living together						
Spouse only	138(72.3)	5(2.6)	30(15.7)	18(9.4)	1919(100.0)	20.495 (.015*)
Parents	2(33.3)	1(16.7)	2(33.3)	1(16.7)	6(100.0)	
Parents-in-law	0(0)	0(0)	0(0)	1(100.0)	1(100.0)	
Spouse's sibling	0(0)	0(0)	1(100.0)	0(0)	1(100.0)	
Total	140(70.4)	6(3.0)	33(16.6)	20(10.1)	199(100.0)	

* $p < .05$ by Chi square test.

Desired day of the week and operation schedule of forest therapy programs

The day of the week that subfertile women preferred was Sunday (54.9%), Saturday (42.2%), and any day either weekday or weekend (23.1%, Table 7). To the question about the operation schedule of forest therapy programs, the number of those who answered once a week, 120 minutes per session, a total of 8 sessions was the highest (61.8%), followed by once a week, 120 minutes per session, a total of 12 sessions (22.6%). These results were similar to the results of Park and Koo (2018) that the number of subjects who answered 1~3 hours for forest therapy programs was high. The preferred number of sessions differed depending on religion and residence (Table 9). First, 64.4% of those who had no religion answered that they wanted once a week, 120 minutes per session, a total of 8 sessions, and 55.1% of those who were christian, 62.1% of those who were catholic, 64.3% of those who were Buddhist, and 66.7% of those who had other religions answered once a week, 120 minutes per session, a total of 8 sessions. Regardless of religion, the number of respondents who wanted to participate once a week, 120 minutes per session, a total of 8 sessions was the highest, and this result can be reflected when determining the number of sessions or hours in the process of designing programs. In terms of

residence, 60.4% of those who lived in Seoul, 67.6% of those who lived in Gyeonggi-do, 50.0% of those who lived in Chungcheong-do, and 100.0% of those who lived in Gangwon-do answered that they wanted to participate once a week, 120 minutes per session, a total of 8 sessions, and 50.0% of those who lived in Jeolla-do wanted to participate once a week, 120 minutes per session, a total of 12 sessions.

Necessity for forest therapy programs for subfertile couples

To the question about the necessity for forest therapy programs for subfertile couples, 53.8% answered no, and 46.2% answered yes (Table 7), which needs to be compared with the result that the number of those who wanted to participate with spouse was the highest. These results can be attributed to the fact that the existence of spouses has two conflicting sides, that is, support and conflict, which can result in ambivalence (Hwang, 1998; Hwang, 2011; Kim, 2012; Park, 1995). The results differed depending on the age of spouses ($p = .043$), and 55.8% of those aged 40 or older answered yes, and 100% of those aged between 20 and 29 answered no (Table 10).

Table 9. Duration of forest therapy program for subfertile women by religion and residence

Category	Frequency(%)							$\chi^2(p)$
	I	II	III	IV	V	VI	Total	
Religion								
None	58(64.4)	17(18.9)	1(1.1)	3(3.3)	1(1.1)	10(11.1)	90(100.0)	41.828 (.003**)
Christian	27(55.1)	13(26.5)	2(4.1)	3(6.1)	0(0)	4(8.2)	49(100.0)	
Catholic	18(62.1)	7(24.1)	1(3.4)	0(0)	0(0)	3(10.3)	29(100.0)	
Buddhism	18(64.3)	8(28.6)	1(3.6)	1(3.6)	0(0)	0(0)	28(100.0)	
Others	2(66.7)	0(0)	0(0)	0(0)	1(33.3)	0(0)	3(100.0)	
Total	123(61.8)	45(22.6)	5(2.5)	7(3.5)	2(1.0)	17(8.5)	199(100.0)	
Residence								
Seoul	87(60.4)	32(22.2)	3(2.1)	6(4.2)	0(0)	16(11.1)	144(100.0)	41.869 (.019*)
Gyeonggi-do	25(67.6)	9(24.3)	2(5.4)	0(0)	1(2.7)	0(0)	37(100.0)	
Chungcheong-do	2(50.0)	1(25.0)	0(0)	0(0)	1(25.0)	0(0)	4(100.0)	
Kyongsang	6(75.0)	1(12.5)	0(0)	1(12.5)	0(0)	0(0)	8(100.0)	
Jeolla-do	1(25.0)	2(50.0)	0(0)	0(0)	0(0)	1(25.0)	4(100.0)	
Gangwon-do	2(100.0)	0(0)	0(0)	0(0)	0(0)	0(0)	2(100.0)	
Total	123(61.8)	45(22.6)	5(2.5)	7(3.5)	2(1.0)	17(8.5)	199(100.0)	

Note. I = once a week, 120 minutes per session, a total of 8 sessions; II= once a week, 120 minutes per session, a total of 12 sessions; III= once a week, 180 minutes per session, a total of 12 sessions; IV= twice a week, 120 minutes per session, a total of 16 sessions; V= twice a week, 180 minutes per session, a total of 16 sessions; VI= others.

* $p < .05$, ** $p < .01$ by Chi square test.

Table 10. Necessity for forest therapy program for subfertile couples by age of spouse and marriage duration

Category	Frequency(%)			$\chi^2(p)$
	Yes	No	Total	
Spouse age				
20-29 years	0(0)	4(100.0)	4(100.0)	8.171 (.043*)
30-34 years	14(38.9)	22(61.1)	36(100.0)	
35-39 years	30(41.1)	43(58.9)	73(100.0)	
Over 40	48(55.8)	38(44.2)	86(100.0)	
Total	92(46.2)	107(53.8)	199(100.0)	
Marriage duration				
Less than 1 year	2(22.2)	7(77.8)	9(100.0)	11.093 (.050*)
1-2 years	14(37.8)	23(62.2)	37(100.0)	
2-3 years	17(47.2)	19(52.8)	36(100.0)	
3-5 years	19(37.3)	32(62.7)	51(100.0)	
5-10 years	33(63.5)	19(36.5)	52(100.0)	
More than 10 years	7(50.0)	7(50.0)	14(100.0)	
Total	92(46.2)	107(53.8)	199(100.0)	

* $p < .05$ by Chi square test.

Desired operation hours of forest therapy programs for subfertile couples

To the question about desired operation hours of forest therapy programs for subfertile couples, the number of those who answered half a day (morning or afternoon) was the highest (38.7%), followed by a day (19.6%), and two days and one night (14.6%), which was similar to the results of Park and Koo (2018) that the number of those who answered a day for forest therapy programs was the highest (Table 8). To the same question, out of 147 women who lived with their spouse only, 52.4% answered that they intended to participate in a half-day forest therapy program (Table 11), and 50.0% of those who lived with their parents together answered that they intended to participate in an one-day forest therapy program. It was found that 100% of those who lived with their husband's siblings answered that they intended to participate in an one-night program.

Qualifications for forest therapists

As qualifications for forest therapists, subjects selected a deep understanding of symptoms of and women with subfertility (65.3%), and an understanding of stress and coping methods (19.1%) (Table 12), which coincided with the results of the report of the Ministry of Health and Welfare (2016) that understanding and sympathy are the basic ele-

ments of and qualifications for psychology counseling. The results on qualifications for forest therapists differed depending on the occupation and birth order of spouses (Table 13), and 100% of those whose spouses were unemployed answered a deep understanding of symptoms of and women with subfertility. Out of those whose spouses were service workers, 55.6% answered an understanding of stress and coping methods, and 69.6% of office workers, 56.3% of self-employed/sales workers, 70.0% of technical workers, and 64.3% of professional workers answered a deep understanding of symptoms of and women with subfertility as a top qualification ($p = 0.036$). In other words, all the spouse occupation groups, except service workers, considered a deep understanding of symptoms of and women with subfertility as a top qualification.

Preferred forest types and locations for forest therapy programs

Forest types preferred by subjects were dense forest (24.1%) and forest with a good view of surroundings (33.2%), and 42.7% answered that they wanted to experience both (Table 14). Natural recreation forest was selected as the most preferred location for forest therapy programs (46%), followed by healing forest (43.9%), urban forest (5.0%), park (4.0%), and school forest (1.0%), which was similar

Table 11. Desired duration of forest therapy program for subfertile couples by family member living together

Category	Frequency(%)						Total	$\chi^2(p)$
	Half day	A day	1 night	2 nights	3 nights	Less than a week		
Spouse only	77(52.4)	38(25.9)	28(19.0)	2(1.4)	0(0)	2(1.4)	147(100.0)	80.116 (.000***)
Parents	0(0)	1(50.0)	0(0)	0(0)	1(50.0)	0(0)	2(100.0)	
Spouse's sibling	0(0)	0(0)	1(100.0)	0(0)	0(0)	0(0)	1(100.0)	
Total	77(51.3)	39(26.0)	29(19.3)	2(1.3)	1(0.7)	2(1.3)	150(100.0)	

*** $p < .001$ by Chi square test.

Table 12. Most important qualification of forest therapist for subfertile women (N = 199)

Category	n	%
A deep understanding and sympathy for the symptoms	125	64.4
Insights and philosophies about the attitudes of religion and subjective life	16	8.2
Understanding of stress and coping methods	38	19.6
Ability of program operation by group and individual	3	1.5
Guidance on the mechanism of body / psychology (connection of body and mind)	12	6.2

to the results of Kim (2015) that people preferred dense and thick forest, forest with a good view of surroundings, natural creation forest, and healing forest. In terms of the types of spaces for programs, 33.7% answered that any types of spaces available are fine (33.7%), followed by cozy spaces surrounded by trees (33.2%), open spaces with grass unfolded in all directions (20.1%), and spaces with wooden decks where a meditation mat can be spread (13.1%).

The results on the preferred locations for forest therapy programs differed depending on the residence of subjects (Table 15). Out of those who lived in Seoul, 46.5% answered they preferred natural recreation forest, and 43.2% of those who lived in Gyeonggi-do preferred healing forest and natural recreation forest respectively. Out of those who

lived in Chungcheong-do, 75.0% preferred healing forest, and 75.0% of those who lived in Gyeongsang-do preferred natural recreation forest. In addition, 50.0% of those who lived in Joella-do answered healing forest and natural recreation forest respectively, and 50.0% of those who lived in Gangwon-do answered school forest and natural recreation forest respectively.

Expected physical effects of forest therapy programs

To the question about forest therapy factors that are expected to be helpful for subfertile women, the share of phytocide was the highest (36.2%), followed by a high level of oxygen (30.2%), and sunshine (20.6%). As expected

Table 13. Qualification of forest therapist for subfertile women by occupation of spouse

Category	Frequency(%)					Total	$\chi^2(p)$
	I	II	III	IV	V		
Unemployed	3(100.0)	0(0)	0(0)	0(0)	0(0)	3(100.0)	32.720 (.036*)
Service	4(44.4)	0(0)	5(55.6)	0(0)	0(0)	9(100.0)	
Office worker	48(69.6)	6(8.7)	11(15.9)	0(0)	4(5.8)	69(100.0)	
Self-employed / Sales	18(56.3)	1(3.1)	8(25.0)	3(9.4)	2(6.3)	32(100.0)	
Technical	21(70.0)	1(3.3)	5(16.7)	0(0)	3(10.0)	30(100.0)	
Professional	36(64.3)	8(14.3)	9(16.1)	0(0)	3(5.4)	56(100.0)	
Total	130(65.3)	16(8.0)	38(19.1)	3(1.5)	12(6.0)	199(100.0)	

Note. I = a deep understanding and sympathy for the symptoms; II = insights and philosophies about the attitudes of religion and subjective life; III = understanding of stress and coping methods; IV = ability of program operation by group and individual; V = guidance on the mechanism of body / psychology (connection of body and mind).

* $p < .05$ by Chi square test.

Table 14. Preferred forest type and location for forest therapy program for subfertile women (N = 199)

Variable	Category	n	%
Forest type	Dense forest	48	24.1
	Forest with a good view of the surroundings	66	33.2
	Both	85	42.7
Forest location	Urban forest	10	5.0
	School forest	2	1.0
	Park	8	4.0
	Healing forest	87	43.7
	Natural recreation forest	92	46.2
Type of space in forest	A cozy space surrounded by wood	65	33.2
	Open space with grass unfolded in all directions	40	20.1
	Space with wooden decks for meditation	26	13.1
	Various types of spaces	67	33.7

physical effects, the share of blood circulation was the highest (49.2%), followed by quality sleep (16.1%) and strengthened immunity (16.1%). As expected psychological effects, the share of meditation opportunity was the highest (40.2%), followed by tranquility in forests (26.6%), a sense of freedom/escape (18.1%) and self-reflection opportunity (12.1%). As the effects of self-help groups in forest therapy programs for subfertile women, the share of improving physical and mental health through shared activities was the highest (41.2%), followed by sympathy based on a common issue called subfertility (28.6%), making friendships and groups to share feelings (14.6%), and exchanging various information on pregnancy (13.1%, Table 16). These results were very similar to the results of Kim (2015). It

was found that the effects of forest therapy expected by subfertile women and the expected effects of forest therapy reported by earlier studies were similar. These results indicate that several effects can be expected from forest therapy programs for improving the physical and mental health of subfertile women. The results on expected physical effects differed depending on the age of subjects and number of family members (Table 17). Those aged between 20 and 29 answered reduced symptoms of cold hands and feet, and cold stomach (28.6%), and quality sleep (28.6%), and 51.7% of those aged between 30 and 34, 53.2% of those aged between 35 and 39, and 45.5% of those aged 40 or older answered blood circulation ($p = .041$). In other words, those aged between 20 and 29 expected that forest therapy

Table 15. Preferred forest location for forest therapy program for subfertile women by residence

Category	Frequency(%)						$\chi^2(p)$
	Urban forest	School forest	Park	Healing forest	Natural recreation forest	Total	
Seoul	5(3.5)	1(0.7)	7(4.9)	64(44.4)	67(46.5)	144(100.0)	62.453 (.000***)
Gyeonggi-do	4(10.8)	0(0)	1(2.7)	16(43.2)	16(43.2)	37(100.0)	
Chungcheong-do	1(25.0)	0(0)	0(0)	3(75.0)	0(0)	4(100.0)	
Gyeongsang-do	0(0)	0(0)	0(0)	2(25.0)	6(75.0)	8(100.0)	
Jeolla-do	0(0)	0(0)	0(0)	2(50.0)	2(50.0)	4(100.0)	
Gangwon-do	0(0)	1(50.0)	0(0)	0(0)	1(50.0)	2(100.0)	
Total	10(5.0)	2(1.0)	8(4.0)	87(43.7)	9(46.2)	199(100.0)	

*** $p < .001$ by Chi square test.

Table 16. Expected effects of forest therapy program for subfertile women (N = 199)

Variable	Category	n	%
Therapy factor in forest	Fresh air	60	30.2
	Moderate sunshine	41	20.6
	Phytoncide	72	36.2
Expected physical effects	Blood circulation	98	49.2
	Strengthened immunity	32	16.1
	Quality sleep	32	16.1
Expected psychological effects	Meditation opportunity	80	40.2
	Self-reflection opportunity	24	12.1
	Tranquility in the forest	53	26.6
	Sense of freedom / escape	36	18.1
Effects of self-help groups	Empathy based on a common issue	57	28.6
	Improving physical and mental health through shared activities	82	41.2
	Exchange of various information for pregnancy	26	13.1
	Making friendships to share feelings	29	14.6

Table 17. Expected physical effects in forest therapy programs for subfertile women by age and family member living together

Category	Frequency(%)									$\chi^2(p)$
	I	II	III	IV	V	VI	VII	VIII	Sum	
Age										
20-29 years	0(0)	1(14.3)	1(14.3)	2(28.6)	0(0)	0(0)	1(14.3)	2(28.6)	7(100.0)	33.484 (.041*)
30-34 years	3(5.2)	30(51.7)	3(5.2)	4(6.9)	8(13.8)	0(0)	2(3.4)	8(13.8)	58(100.0)	
35-39 years	4(5.1)	42(53.2)	2(2.5)	5(6.3)	7(8.9)	2(2.5)	3(3.8)	14(17.7)	79(100.0)	
Over 40	2(3.6)	25(45.5)	0(0)	3(5.5)	17(30.9)	0(0)	0(0)	8(14.5)	55(100.0)	
Total	9(4.5)	98(49.2)	6(3.0)	14(7.0)	32(16.1)	2(1.0)	6(3.0)	32(16.1)	199(100.0)	
Family member living together										
Spouse only	7(3.7)	94(49.2)	6(3.1)	14(7.3)	31(16.2)	2(1.0)	5(2.6)	32(16.8)	199(100.0)	46.525 (.001***)
Parents	2(33.3)	3(50.0)	0(0)	0(0)	1(16.7)	0(0)	0(0)	0(0)	6(100.0)	
Parents-in-law	0(0)	1(100.0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(100.0)	
Spouse's sibling	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(100.0)	0(0)	1(100.0)	
Total	9(4.5)	98(49.2)	9(3.0)	14(7.0)	32(16.1)	2(1.0)	6(3.0)	32(16.1)	199(100.0)	

Note. I = muscle strengthening; II = blood circulation; III = pelvic exercise; IV = reduced symptoms of cold hands, feet, and stomach; V = strengthened immunity; VI = exercise for digestive health; VII = body fat loss; VIII = quality sleep.

* $p < .05$, *** $p < .001$ by Chi square test.

programs reduce symptoms of cold hands and feet and cold stomach, and provide quality sleep, and those aged 30 or older expected that the programs improve blood circulation. In addition, 49.2% of those who lived with their spouse only, 50.0% of those who lived with their parents together, and 100.0% of those who lived with their parents-in-law together answered blood circulation, and 100% of those who lived with their spouse's siblings together answered body fat loss ($p = .001$).

Conclusion

In this study, a survey was conducted on 199 women who visited a fertility clinic in Seoul, and their interest in and needs for forest therapy programs were surveyed based on their demographic characteristics in order to provide basic data for developing and executing forest therapy programs for the physical and mental health of subfertile women. The following results were reached. First, subfertile women's awareness and experience of forest therapy were both low, but they were found to be positive about participating in the programs. Second, they were found to prefer to participate in a small-group program for a half

day during weekends with their spouse. Third, therapeutic factors that subfertile women expected from forest therapy programs included phytoncide (35.8%) and a high level of oxygen (29.9%). Fourth, subfertile women were found to expect from forest therapy programs physical and mental health such as improved blood circulation and immunity, and meditation opportunity. Fifth, they expected the most an understanding and sympathy of subfertility from forest therapists (62.2%). Since this study conducted a survey on 199 subfertile women only, it is difficult to generalize the results of this study. It will be necessary to conduct a follow-up study on a larger number of subfertile women in a broader region, which is expected to lead to more effective forest therapy programs for promoting the physical and mental health of subfertile women.

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