

Effects of Forest Bath (Shinrin-Yoku) and Forest Therapy (Shinrin-Ryoho) on Women's Health

Kadın Sağlığında Orman Banyosu (Shinrin-Yoku) ve Orman Terapisinin (Shinrin-Ryoho) Etkileri

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ABSTRACT

Forest bathing is an approach that uses the healing effects of forests to improve people's health and prevent disease through forest walks. Although the terms forest therapy and forest bath are used in the same sense, they are different applications. While the forest therapy application is carried out in the company of a professional trained in this subject, the therapist in the forest bath is the forest itself. Considering the positive effects of forest bathing on the cardiovascular system, nervous system, endocrine system, immune system and mental health, it is thought that it can be used as an approach to protect and improve women's health. In this context, the aim of the study is to examine the physiological and psychological effects of forest bathing and forest therapy on women's health. In this study, which was revealed by literature review, the results of national and international studies on the subject were compiled. Many positive effects of forest bathing and forest therapy on the protection of human health have been reported in the literature. There are limited studies on the effects of forest therapy and forest bathing on human health, and no scientific research has been found in the field of health in our country. It is thought that these practices can be used in our country, which is rich in forests, and that scientific studies on this subject can provide benefits for women's health.

Keywords: Forest bathing, forest therapy, women's health

ÖZ

Orman banyosu, orman yürüyüşleri yoluyla insanların sağlığını geliştirmek ve hastalıkları önlemek için ormanların iyileştirici etkilerini kullanan bir yaklaşımdır. Orman terapisi ve orman banyosu terimleri aynı anlamlarda kullanılmakla birlikte farklı uygulama şekilleridir. Orman terapisi uygulaması bu konuda eğitim almış profesyonel kişi eşliğinde yapılırken orman banyosunda terapist ormanın kendisidir. Orman banyosunun kardiyovasküler sistem, sinir sistemi, endokrin sistem, bağışıklık sistemi ve ruh sağlığı üzerindeki olumlu etkilerine bakıldığında kadın sağlığının korunması ve iyileştirilmesinde bir yaklaşım olarak kullanılabilirliği düşünülmektedir. Bu bağlamda çalışmanın amacı orman banyosu ve orman terapisinin kadın sağlığı üzerindeki fizyolojik ve psikolojik etkilerinin incelenmesidir. Literatür taraması yapılarak ortaya konan bu çalışmada, konu üzerine yapılan ulusal ve uluslararası çalışmaların sonuçları derlenmiştir. Literatürde insan sağlığının korunmasında orman banyosu ve orman terapisinin pek çok olumlu etkisi bildirilmiştir. Orman terapisi ve orman banyosunun insan sağlığına etkileri konusunda sınırlı sayıda araştırma mevcut olup, ülkemizde bu konuda sağlık alanında bilimsel bir araştırmaya rastlanmamıştır. Ormanlar açısından zengin olan ülkemizde bu uygulamaların kullanılabilirliği ve bu konuda bilimsel çalışmalar yapılmasının kadın sağlığına faydalar sağlayabileceği öngörülmektedir.

Anahtar sözcükler: Orman banyosu, orman terapisi, kadın sağlığı

Introduction

At present, besides other treatments, Complementary/Alternative Medicine (CAM) methods are used in the treatment of gynecological diseases, and palliation or elimination of complaints. (Amanak et al. 2013). The CAM methods in the world and in our country are used to reduce health care demands and treatment costs, prevent health problems and as a method of cost-efficient treatment, and use of it is increasing rapidly.

With the increase in urbanization in the world and the decrease in natural green environments, physiological and psychological diseases increase, especially caused by stress, and in this case, they negatively affect the welfare and health of people (Yu et al. 2017). In terms of health, especially women can be more affected by this negative situation. Because women have more negative life experiences and stress due to compelling reasons, and correspondingly, their disease burden is higher than men. (WHO 2012). Lifestyles disconnected from nature,

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which pave the way for the emergence of new serious diseases, are seen as an increasing health burden all over the world. (Maller et al. 2005). As a result, the use of natural green and forested areas in health development and protection is increasing. One of these methods is forest bathing or Shinrin-Yoku in Japanese. Forest bathing means giving oneself completely to nature and feeling nature with five senses. In other words, forest bathing is an approach that uses the healing effects of forests to improve the health of people and prevent disease through forest walks (Li and Kawada 2014). Forest bathing is more of an exercise for the mind, unlike a normal walk, without any specific goal or physical effort (Li 2019a). The term was first coined in 1982 by Tomohide Akiyama, Director General of the Japan Ministry of Agriculture, Forestry and Fisheries (MAFF), and it was stated that the Japanese people need healing through nature (Clifford 2018, Li 2019a). In 1999, Prof. Dr. Iwao Uehara from Tokyo University identified another term called forest therapy, or Shinrin-Ryoho, and emphasized that it was ideal therapy for people with diseases that originate from their lifestyle (Williams 2020).

Table 1. Forest bathing and forest therapy implementations	
Forest Bathing	Forest Therapy
There's no need for a guide. It can be applied by anyone. The forest bath is a short-term forest visit, covering a calm and mindful walk in the forest. It can be done individually or in groups. Forest bathing does not require a specific routine program.	It is always carried out by a certified professional who has been trained in this subject. In forest therapy, certain methods are used in addition to walking in the forest to increase the healing effect of forests. It is done in groups. Forest therapy follows a standard routine in accordance with planned activities.
(Clifford 2018, Park et al. 2020)	

Although forest bathing (Shinrin-Yoku) and forest therapy (Shinrin-Rhoyo) are often referred to as the same thing, their main difference is their implementations (Table 1). Forest therapy (Shinrin-Ryoho) is always carried out by a certified professional. As for forest bathing (Shinrin-Yoku), it can be applied by anyone. The main principle in forest bathing is to understand that the forest itself is the therapist (Clifford 2018). The basic principle in forest therapy is the perception of the forest environment with the five senses (the "five sense experiences including sight, smell, hearing, touch, and taste") combined with meditation and walking in the forest. In forest therapy, certain methods are used together with walking in the forest to increase the healing effect of forests. Forest therapy programs often use methods such as psychotherapy, plant therapy, water therapy, diet, climate therapy, and exercise therapy. Some forest therapy programs only consist of meditation, including breath meditation and walking meditation (Park et al. 2020). Forest therapy follows a standard routine in accordance with planned activities. This routine consists of the initial meet and greet activities, followed by sensory exercises, physical exercises, and ends with a tea ceremony that supports the integrity of the forest therapy session. The first stage in forest therapy is the process of creating a secure framework, clarifying uncertainties, and building trust between participants and the guide. At this stage, it is also very crucial for the participants to establish a connection with the forest. The second stage is to explore the forest. This exploration is not about whether a tree is an oak or beech, but how it looks or how it feels to touch the trunk of a tree. The third stage is the stage in which individual sensory exercises are carried out. Individuals scatter into different parts of the forest and then return to the gathering area. Experience has demonstrated that with each consecutive exercise people develop a deeper state of sensory awareness. The final stage is the shift from dynamism to serenity. At this stage, exercises such as meditation, and visualization are applied. Forest therapy implementation steps are shown in Table 2 (Felber 2019).

Scientific studies have been carried out in Japan since 2004 to investigate the effects of the forest environment on human health. In the same year, the Therapeutic Effects of Forests Association was established in order to carry out the Therapeutic Effects of Forests project in Japan. As a result of these studies, a new medical science called Forest Medicine was established. Forest Medical is a new interdisciplinary science of alternative medicine, environmental medical and protective medicine categories that investigate the effects of the forest environment on human health (Li 2019b). In parallel with the developments in Japan, similar studies were carried out at the global level through the International Union of Forest Research Organizations with the COST (European Cooperation in Science and Technology) action E39 project on forest and human health in Europe between 2004-2008 (Park et al. 2011).

In China, the concept of forest therapy was introduced in 2012 and practices began in 2013 (Zhang et al. 2020). China has been carrying out various activities related to forest therapy since 2015. There are also activities and studies related to forest therapy in countries such as Taiwan and Korea. Even though Turkey has rich forest resources, forest therapy activities are not yet available in our country (Gürbey et al. 2020). However, in our country, studies on practices such as forest therapy and forest bathing have been found in the field of ecotourism, yet there is not any scientific research has been found on the subject in the field of health.

Stages	Content	Activities
1. Initial contact	Creating a safe environment Building trust between participants and guide Establishing a connection with the forest	Meet and greet Stretching exercises Therapeutic activities (games, hugging a tree, etc.) Herbal tea time with group communication (Talking, asking questions, and sharing experiences while drinking herbal tea)
2. Exploring the forest	Experiencing the forest	Observing the forest and how it feels. Paired stretching exercises Focusing on deep breath Herbal tea time with group communication
3. Individual experience (Self-discovery)	Feeling the forest more deeply by experiencing it individually	Stretching exercises Focusing on breathing while walking slowly Individual sensory exercises (Lying in the forest, looking at the sky, focusing on experiencing nature with the senses) Herbal tea time with group communication
4. Serenity	Shifting from dynamism to serenity	Paired stretching exercises Yoga Meditation (Focusing on the stream of consciousness while sitting in the forest) Herbal tea time with group communication

(Felber 2019)

There are numerous studies in the literature that include the positive effects of forest bathing on health (Li 2010, Ochiai et al. 2015, Kim et al. 2020). It has positive effects on the gastrointestinal system (such as healing stomach ulcers, facilitating digestion) and the respiratory system (respiratory system diseases and allergies). In addition, it has been reported that forest bathing has positive effects on emotional welfare and mental health by reducing stress, depression, anger, fatigue, improving mood, concentration and memory, and increasing the sense of relaxation (Gürbey et al. 2020). Given the positive effects of forest bathing on the cardiovascular system, neural system, endocrine system, immune system and mental health, it is thought that it can be used as an approach to protect and improve women's health. The aim of this study is to examine the physiological and psychological effects of forest bathing and forest therapy on women's health in line with the literature.

Physiological Effects on Women's Health

Cardiovascular System

Cardiovascular diseases (CVD) are one of the leading causes of mortality and morbidity in the world and are among the leading causes of death in women. The number of global deaths caused by cardiovascular diseases has increased by 12.5% in the last decade (Han et al. 2020). This stems from the significant increase in human life expectancy due to increased quality of life. Senescence is a leading irreversible risk factor for many chronic diseases such as CVD, cancer, and neurodegenerative disease (Kontis et al. 2017). When lifestyle is not considered, CVD can be a risk factor for young people. The European Cardiology Association's "Red Alarm in the Heart of Women" results reported that women have lower awareness of their own risk factors than men and their participation in screening programs (Stramba-Badiale 2009). The first step in protecting from CVD is to provide and sustain healthy lifestyle behaviors, especially for women, such as healthy nutrition, physical activity, and effective stress management.

In the literature, many positive effects of forest bathing and forest therapy were reported in the protection of cardiovascular health. A randomized controlled trial in elderly women found that walking in the forest for 1 hour improved arterial stiffness and lung function (Lee and Lee 2014). In a study examining the effect of the short forest bathing program in middle-aged and elderly individuals, it was reported that the pulse rate, systolic and diastolic blood pressure were found to be significantly lower after the program, which is a physiological indicator of the reduction of stress (Yu et al. 2017). In three studies examining the effects of forest bathing in middle-aged and elderly individuals, positive effects of forest bathing on the cardiovascular system were reported. It was stated that the participants in the study had lower heart rate and systolic-diastolic blood pressure after forest bathing (Ochiai et al. 2015, Song et al. 2015, Song et al. 2017). In a study examining the physiological and

psychological effects of forest bathing in young women, it was noted that participants with high blood pressure had a decrease in blood pressure after walking, while those with low blood pressure had an increase in blood pressure. This result suggests that forest bathing can be used as a tool to achieve appropriate blood pressure (Song et al. 2019). Although the most susceptible group to CVD are elderly, recent studies have found that young adults suffering from CVD are increasing exponentially. From 1995 to 2014, it was reported that 30% of individuals with CVD were young adults, with the greatest increase observed in young women (Kontis et al. 2017). Considering the positive effects of forest bathing on the cardiovascular system in the literature, it is thought that it can be applied as a preventive intervention for women and especially young women to maintain their cardiovascular health.

Immune System

The immune system is a system that recognizes all substances that are foreign and harmful in a living being and protects it from diseases by reactions that fight to destroy them. The immune system is vital for maintaining and improving human health (Chinen et al. 2006). Various factors such as stress, age, and lifestyle can affect the performance of the immune system. Due to the weakening of the immune system of individuals, diseases such as inflammation, psychosomatic diseases, metabolic diseases and cancer occur (Alonso-Aperte and Varela-Moreiras 2000). It has been reported that forest bathing improves immune system function, reduces urinary adrenaline and noradrenaline, salivary cortisol levels, and has a relaxing effect. Natural killer cells (NK- cells), which have critical importance for the innate immune system, are used in the evaluation of immunological activity due to their rapid response to viral infections and tumor growth (Lyu et al. 2019). It has been reported that individuals with high NK cell activity have a low incidence of cancer, while individuals with low NK cell activity have a high incidence of cancer (Imai et al. 2000). Furthermore, it has been found that NK cells can detect and control cancer at an early stage and therefore they are important in anticancer therapy. In researchers examining the effect of forest bathing on NK cells and as an anticancer treatment in women with stage 3 breast cancer, it was unearthed that forest bathing increased NK cell population and activity (Li et al. 2008, Lyu et al. 2019).

Forest bathing directly impacts the immune system through phytoncides, which are volatile substances emitted by plants. It boosts NK cell activity by increasing the number of NK cells and replicating antibody protein in NK cells (Li et al. 2010, Li 2010). On the other hand, stress and stress hormones suppress immune function (Imai et al. 2000). Stress increases cortisol levels and high cortisol levels reduce NK cell activity (De Amici et al. 1999). Forest bathing indirectly affects the immune system by reducing stress hormone levels, increasing NK cell activity, and through the autonomic nervous system and endocrine system (Li et al. 2010, Li 2010). These results demonstrate that forest bathing can be helpful in improving the human immune system. In addition, the positive effect of forest bathing on immune system function is considered important in terms of preventive health care.

Neuroendocrine System

The neuroendocrine system is a system consists of neurons, endocrine glands, and non-endocrine tissues that receive signals to secrete neurochemicals and hormones that the body needs (Levine 2012). This system plays a significant role in the homeostasis of the body. The hypothalamus and pituitary gland, which are the most important components of the neuroendocrine system, affect the health of women in all life stages through hormonal management (Şen 2015). In literature, studies examining the effects of forest bathing on the neuroendocrine system concentrate on blood glucose level, sympathetic and parasympathetic nervous system, stress, and relaxation. In a study where the effects of forest bathing on blood glucose values are examined in diabetic patients who are not insulin-dependent, forest walks of 3 or 6 km have been carried out, depending on their physical abilities and the existence of diabetes complications, and they were followed for 6 years. After the forest walk, a decrease in average blood glucose levels of the participants [Before 179 (SEM 4) mg. 100 ml⁻¹, after 108 (SEM 2) mg. 100 ml⁻¹ ($p < 0.0001$)] was detected. Moreover, a decrease in the A1c level of glycated hemoglobin from 6.9% (before the first-forest bath) to 6.5% (SEM 0.1) (after the last-forest bath; $p < 0.05$) was also observed. In the same study, it was reported that in addition to reducing blood glucose levels with increased calorie consumption and improved insulin sensitivity, forest bathing has other beneficial effects such as changes in hormonal secretion and autonomic nervous system functions (Ohtsuka et al. 1998).

In the study of Kim et al. (2020), the effects of forest therapy in postmenopausal women who suffer from sleeplessness were evaluated by cortisol levels and polysomnography (PSG). As a result, a significant decrease in cortisol levels (from 10.2 ± 3.79 to 7.75 ± 2.81), shorter time to fall asleep, decreased waking ups during sleep,

and increased total sleep time were detected in PSGs that demonstrate sleep efficiency. It has been stated that forest bathing can be a good alternative to non-pharmacological treatment for the palliation of sleep deprivation in postmenopausal women. In the study of Ochiai et al. (2015), the effects of forest bathing were examined in middle-aged women, and as a result, it was revealed that forest bathing provided a significant decrease in pulse rate and salivary cortisol levels. In accordance with the literature, it is considered that forest bathing has positive effects on the neuroendocrine system by assisting to provide effective relaxation and stress management.

Psychological Effects on Women's Health

Women's health is as focused on the psychological needs of a woman as physical and social needs that she encounters throughout her life. Reasons such as urban life and environmental conditions (Park et al. 2010), being a student (Eisenberg et al. 2007), and health problems according to life periods (Koyun et al. 2011) affect women's mental health and increase their stress levels. It is important to recognize the positive effects of forest bathing and forest therapy on mental health, especially since women living in urban areas have a high risk of exposure to stressful situations and developing chronic mental health disorders.

It is detected that studies examining the effects of forest bathing and forest therapy on mental health in the literature are associated with mental state, stress, anxiety, depression, burnout syndrome, and mild cognitive inefficiency (Stier-Jarmer et al. 2021). Research on psychology suggests that after people spend their time in the forest, their negative mood decreases, and their positive mood increases significantly (Tsunetsugu et al. 2013, Takayama et al. 2014). In similar studies, it was found that a short walk in a natural environment reduces negative emotions (Hartig et al. 2003, Berman et al. 2008, Park et al. 2011, Marselle et al. 2014) and physiological stress (Hartig et al. 2003, Marselle et al. 2014), provides a greater reduction and increase in positive emotions compared to urban environmental walking (Hartig et al. 2003, Berman et al. 2008, Marselle et al. 2014). In a study by Song et al. (2019) conducted with young women, it was found that taking a short walk in the forest reduced negative emotions such as tension-anxiety, depression-sadness, anger-hostility, fatigue and confusion, and provided psychological relief. In the study of Ochiai et al. (2015), it was revealed that forest bathing increased positive emotions and decreased negative emotions in middle-aged women. Similar results were obtained in a similar study conducted with elderly individuals by Yu et al. (2017).

Stress is a risk factor for the individual in terms of experiencing physical, emotional, psychological problems and suffering chronic disease. Therefore, practices that will reduce the stress level of the individual and help with stress management appear as an important step in the protection of physical and mental health. Forest therapy, which is one of these practices, is effective in alleviating depression (Furuyashiki et al. 2019), managing stress in individuals with high stress (Dolling et al. 2017), and it should be combined with cognitive behavioral therapy in the treatment of burnout syndrome (Sonntag-Öström et al. 2015) in order to be effective. In a similar study, which explores the exhaustion and stress of female workers, it was found that forest therapy provides a reduction in stress levels and improvement in the mental health of women (Jung et al. 2015). In a study in which the effect of forest therapy on stress and quality of life in postmenopausal women was investigated, it was determined that forest therapy increased the quality of life, reduced stress, and positive effects lasted at least a month (Yu et al. 2016). In a similar study, it was unearthed that forest therapy reduced the stress level in postmenopausal women (Kim et al. 2020). These results demonstrate that forest therapy can be a valuable, low-cost treatment option for women suffering from a variety of postmenopausal symptoms.

There are also studies in the literature examining the effects of forest-based impacts on various aspects of mental health. In a meta-analysis examining the effects of forest bathing and forest therapy on mental health, it was reported to be effective for depression, stress and anger, especially anxiety (Kotera et al. 2022). In a similar systematic review, studies with different sociodemographic groups, such as university students, workers, and middle-aged women, it was stated that forest bathing and forest therapy have a therapeutic effect on mental health (Rajoo et al. 2020). The beneficial effects of forest bathing and forest therapy on stress, depression, anxiety, and negative emotions are evidence of the efficiency of these practices on mental health. It is reported that being in nature can stimulate our soothing system and protect our mental health through supporting compassion, security, and attachment (Kotera et al. 2022).

Conclusion

Although the healing effect of the natural environment on human health has been known for a long time, it is noticed that forest bathing and forest therapy are not widely executed in the field of health. There are limited studies on the effects of forest bathing and forest therapy on human health, and there is not any scientific

research has been found in the field of health in our country. However, studies have found that forest bathing and forest therapy have positive effects on both physiological and psychological health. Forest bathing and forest therapy have the potential to be a cost-effective preventive health practices. In this context, it is thought that the use of this CAM method in Türkiye, which is rich in forests, can be useful in important problems, which we have not encountered in the literature yet, especially those affecting women's health such as infertility, premenstrual syndrome, polycystic ovary syndrome, as well as in pregnancy and perimenopausal symptoms, and scientific studies on this subject can be beneficial in protecting and improving women's health.

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