

## FOREST BATHING: HEALTH THAT COMES FROM INTERACTING WITH NATURE



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### ABSTRACT

The connection between humans and the natural environment has been increasingly studied and is being recognized by researchers and health professionals regarding its physical and mental benefits. What studies on forest bathing have concluded in relation to their benefits for human health is what is of interest in this research to be deepened. The methodology is the literature review. As a result, it was identified that forest bathing helps human health due to increased willingness for physical activity and vitality, improves mood, sleep quality and blood pressure indexes, reduces stress levels and symptoms of depression and anxiety, brings cognitive benefits, with improved attention and memory, benefit the immune system, in addition to generating reflections on quality of life, well-being and the elevation of positive feelings. Even so, the authors indicate the need for more research to be conducted in different contexts of the planet.

**Keywords:** Nature, Health, Literature review, Benefits.

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## INTRODUCTION

Recent studies have explored the physical and mental benefits of forest bathing, a widely recognized cultural practice in Japan and South Korea, where it is known as "Shinrin-yoku" and "Sanlimyok," respectively (Bjorbækmo & Engedal, 2020). The practice of spending variable time in forest environments. These countries have even developed national health programs that incorporate forest bathing as a preventive and curative therapy (Hansen *et al.* 2017).

Hansen *et al.* (2017) explain that the current literature supports the wide-ranging health benefits of exposure to nature and green environments in human systems. Lee *et al.* (2012) reiterate that, in recent years, the relationship between human health and well-being and forest ecosystems has received increasing attention, not only in multidisciplinary research, but also in international and national political discussions and processes.

Miyazaki (2018) describes the Japanese symbols for shinrin-yoku. The first is the forest (three trees), the second the wood (two trees), and the third "bathing" (running water on the left, and a valley on the right): 森林浴. Although the term shinrin-yoku can be literally translated as "forest bathing", one does not literally need to take a bath, but rather immerse oneself in the forest environment, using all one's senses to experience nature up close (Miyazaki, 2018). The author explains that forest bathing can be understood simply as the practice of walking slowly through the forest.

For Park *et al.* (2010), the term shinrin-yoku (entering the forest atmosphere or bathing in the forest) was coined by the Japanese Ministry of Agriculture, Forestry and Fisheries in 1982. It can be defined as coming into contact with and absorbing the atmosphere of the forest: a process aimed at improving an individual's state of mental and physical relaxation. This practice is considered the most widespread activity of association between the forest and human health (Park *et al.* 2010).

Miyazaki (2018) states that the calming properties of nature have been used since ancient times. Because it is a natural and effective way to achieve a relaxed state, the author reports that forest bathing can be used as a complementary therapy to conventional treatments for those suffering from mental conditions. Contact with nature can help provide a feeling of connection, healing, and well-being, which can be difficult to achieve in other settings. We feel better when we are surrounded by nature, says the author, as it helps to restore vital energy, which allows us to achieve a state of inner calm.

Studies have pointed out that the practice of forest bathing as a form of exposure to nature can benefit the health of men and women of all ages and in different contexts. What studies on forest bathing have concluded in relation to their benefits for human health is what is interesting in this article. The methodology is the literature review. As a result, the main results pointed out in the studies are gathered.

## **METHOD**

The number of research on forest bathing has increased every decade, constituting a relevant reference, with dense and vigorous results regarding the various benefits of the practice. A search was carried out in the SciELO database on April 1, 2023, using the descriptors "forest bathing" and "shinrin-yoku", and articles were selected that, in their objectives, referred to the practice of forest bathing and its health benefits. Then, the books that directly address the theme were checked, as they are most cited in these articles. The compilation of these publications involving the theme is presented in this article.

## **FOREST BATHING AND EFFECTS ON HUMAN HEALTH**

In this section we present in Illustrative Studies some characteristics of research that has been carried out and, subsequently, in the Cross-Studies, the results of all bibliographic research are presented, according to the types of benefits that forest bathing provides to the human being.

### **a) Illustrative studies**

In the research carried out in 24 forests in Japan, Park *et al.* (2010) were intended to clarify the physiological effects of Shinrin-yoku. In each experiment, 12 subjects (a total of 280 of varying ages) walked and observed a forest or urban area. The results show that forest environments promote lower cortisol concentrations, lower heart rate, lower blood pressure, greater parasympathetic nervous system activity, and lower sympathetic nervous system activity compared to urban environments. The results of the physiological measurements suggest that shinrin-yoku can aid in the effective relaxation of the human body, and the psychological effects of the forest areas were correlated with the various physical environmental factors of the forest. The authors suggest the use of forestry practice as a strategy for preventive medicine.

Qing Li (2018, 2022) addressed the benefits of forest bathing in the treatment of mental illness. He reports that participants who spent time in nature had significant improvements in symptoms associated with stress, anxiety, and depression. Qing Li (2018) understands that as a society, we suffer from nature *deficit* disorder, but studies have shown that shinrin-yoku can promote health, as nature can help improve people's mental health by helping to induce relaxation and tranquility. Additionally, contact with nature can help people reinforce feelings of connection to their surroundings, which is particularly beneficial for those suffering from anxiety or depression (Li, 2018).

Bielinis *et al.* (2018) conducted a study with sixty-two participants divided into two groups. Participants completed four psychological questionnaires before and after exposure: Profile of mood states; Scale of positive and negative affects; Subjective vitality scale and Restorative outcome scale. At the end of the research, the authors realized that the forest environment caused a decrease in the negative subscales of the mood state and an increase in the positive subscale (vigor). In addition, after exposure to the forest environment, participants had the highest scores on the Subjective Vitality Scale, Restorative Outcomes Scale, and on a positive subscale of the Positive and Negative Affect Scale. The authors concluded that under Central European conditions, short interaction with the forest during the winter had a substantial emotional, restorative, and vitalizing effect on the participants surveyed.

Li (2022) points out that, in Japan, since 2004, serial studies have been conducted to investigate the effects of forest environments on human health, and the following beneficial effects have been reported: increased activity of human *natural killer* (NK) cells, number of NK cells, and intracellular levels of anticancer proteins, suggesting a preventive effect on cancer; reduced blood pressure and heart rate, showing a preventive effect on hypertension and heart disease; reduction of stress hormones, such as urinary adrenaline and noradrenaline, as well as salivary/serum cortisol; increased activity of parasympathetic nerves and reduced activity of sympathetic nerves, stabilizing the balance of the autonomic nervous system; improved sleep; increased levels of serum adiponectin and dehydroepiandrosterone sulfate; in the Mood States Profile test, they reduced scores for anxiety, depression, anger, fatigue and confusion, and increased the vigor score, showing preventive effects on depression. The author suggests that forest bathing be used in rehabilitation medicine and as a preventive effect, as it increases immune function and reduces mental stress.

In a study by Li *et al.* (2008) investigated how long the increased activity of NK cells remains and compared the effect of a forest bathing trip on NK cell activity with a trip to sites in a city without forests. Twelve healthy male subjects, aged between 35 and 56 years, were selected and made a three-day/two-night trip to forest fields and to a city, in which the activity levels during the two trips were equivalent. At the end of the research, it was found that the forest bathing trip significantly increased the activity of NK cells and the number of NK cells, perforin, granulysin, and granzyme AIB-expressing cells, and significantly decreased the concentration of adrenaline in the urine. The increased NK cell activity lasted for more than 7 days after travel. In contrast, a tourist visit to the city did not increase NK cell activity or the number of NK cells or the expression of selected intracellular anticancer proteins, nor did it decrease the concentration of adrenaline in the urine. Phytocides such as alpha-pinene and beta-pinene have been detected in forest air. It was concluded that phytocides released from trees and the decrease in stress hormone may partially contribute to the increased activity of NK cells.

#### b) Cross-studies

This section presents the convergence regarding the results of the studies found in the search carried out in Scielo. It was identified that some publications reported an increase in willingness for physical activity and vitality among forest bathers (Hartig *et al.*, 2014; Lee *et al.*, 2011; Park *et al.*, 2010; Hansen, Jones and Tocchini, 2017; Mao *et al.*, 2022; Li, 2010)

Sleep quality also improved after forest bathing practices, which was evidenced by Lee *et al.* (2011), Park *et al.* (2010), Morita *et al.* (2007) and Joung *et al.* (2019). Morita *et al.* (2011) explains that contact with nature can promote better sleep quality by regulating circadian rhythms.

The immune system benefited, as research showed that there was an increase in the activity of NK (*Natural Killer*) cells, responsible for the body's defense against infections and tumors (Li *et al.*, 2020; Mao *et al.*, 2022; Park *et al.*, 2010).

Other studies indicate that blood pressure indices have improved (Song *et al.*, 2016; Twohig-Bennett & Jones, 2018; Li *et al.*, 2016) which is related to heart rate regulation, according to Hansen *et al.*, (2017) and Park *et al.*, (2010).

Evidence that forest bathing reduces stress levels was presented by Hartig *et al.* (2014), Lee *et al.* (2011), Mao *et al.* (2022), Park *et al.* (2010), Song *et al.* (2016),

Twohig-Bennett & Jones (2018), Hansen *et al.* (2017), Joung *et al.* (2019), Hansen, Jones and Tocchini (2017), Li (2010) and Li *et al.* (2016). Also, forest bathing can help reduce symptoms of depression and anxiety, according to Ideno *et al.* (2017), Hansen *et al.* (2017) and Igarashi *et al.* (2019).

Alguns autores indicam melhora do humor, caso de Hartig *et al.* (2014), Lee *et al.* (2011), Park *et al.* (2010), Song *et al.* (2016), Twohig-Bennett & Jones (2018), Park *et al.* (2010), Hansen, Jones e Tocchini (2017) e Mao *et al.* (2022).

In addition, presence in the forest has been associated with cognitive benefits, such as improved attention and memory (Berman *et al.*, 2008; Park *et al.*, 2010; Bratman, Hamilton & Daily, 2012; Twohig-Bennett & Jones, 2018). Mygind *et al.* (2019) demonstrated that children who frequently play in natural environments have better cognitive development and fewer behavior problems.

Quality of life and well-being benefit from this type of contact with nature, Morita *et al. concluded.* (2007), Marselle *et al.* (2019), Hansen *et al.* (2017) and Mao *et al.* (2022), which is linked to a deeper connection with the natural environment (Iwata *et al.*, 2016) and the elevation of positive feelings (Mao *et al.*, 2022).

## **MORE STUDIES ARE NEEDED**

In view of the benefits of forest bathing pointed out in the studies presented, it is necessary for health professionals, educators and public policy makers to consider the benefits of forest bathing when planning strategies to promote collective health. Public policies should be implemented to expand green spaces in urban areas, especially because it is where most of the world's population is concentrated, and to facilitate access to outdoor activities (Keniger *et al.*, 2013).

Lee *et al.* (2022) state that there is a growing understanding that the wider application of forest therapy and the provision of easily accessible, nature-based health services could significantly reduce public health budgets. However, the authors warn that putting this proposal into practice requires strong cooperation between different sectors, especially among forestry, health and environmental professionals.

Also, more studies need to be conducted, as a more solid evidence base is needed on the physiological and psychological health benefits of forest therapy, considering that cultural, individual, and social differences affect the experience and health benefits of green environments (Lee *et al.*, 2022).

Hansen *et al.* (2017) report that longitudinal research, conducted around the world, is still needed to produce new evidence of the relationships associated with shinrin-yoku and clinical therapeutic effects, however, there is evidence of how a health promotion method and potential universal health model is applied in reducing the "stress state" and "technostress" of modern times.

## **FINAL CONSIDERATIONS**

The studies gathered point out, in summary, as benefits of forest bathing, increased willingness for physical activity and vitality, improved sleep quality, benefits to the immune system, improved blood pressure indexes, reduced stress levels and symptoms of depression and anxiety, improved mood, cognitive benefits, improved attention and memory, as well as quality of life and well-being, with an increase in positive feelings.

Even in the face of these benefits pointed out by numerous studies, the authors indicate the need for greater scientific basis, with longitudinal research being conducted in different contexts of the planet.



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