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Sauna and health: How regular sauna sessions affect the body's health

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Abstrakt

Sauna use, practiced for thousands of years, has its roots in Finnish culture, where it was considered an essential part of health and hygiene. In recent years, a growing body of scientific research has confirmed the numerous health benefits associated with regular sauna use. This research review focuses on the effects of sauna sessions on the body's health, with particular emphasis on the cardiovascular system, blood pressure, respiratory system and urinary system. Analyses show that regular sauna use contributes to lowering the risk of cardiovascular disease by reducing blood pressure and improving the lipid profile. In addition, sauna has a beneficial effect on lung function, reducing the risk of diseases such as chronic obstructive pulmonary disease and pneumonia. It is also worth noting that sauna baths are safe for patients with kidney disease, as confirmed by research results. These indications underscore the importance of regular sauna sessions as a form of health support, helping to improve quality of life and long-term well-being.

Keywords: Cardiovascular disease; Heat stress; blood pressure; ; sauna bathing; heat therapy.

1. Introduction

Using a sauna is a practice that has been known for thousands of years, with its roots in Finnish cultures, which considered the sauna not only a place to relax, but also an important part of health and hygiene care (1,2). Nowadays, the popularity of saunas has grown worldwide, with more and more scientific studies focusing on its health benefits. Saunas, by exposing the body to high temperatures, affect various aspects of physical and mental health, from improving cardiovascular function to reducing stress and improving mood (1–3). Modern forms of sauna use include the traditional Finnish sauna, as well as other variations, such as the Turkish bath. The most popular and best researched type of sauna is the Finnish sauna, which, unlike the Turkish sauna, differs in dry air and high temperatures. (2). A typical sauna cycle consists of several short body warming sessions, lasting from 5 to

20 minutes, which are interrupted by body cooling and fluid replenishment. The optimal temperature in a sauna is between 80°C and 100°C at the height of the sauna user's face, and about 30°C near the floor. Humidity typically ranges from 15% to 30%, or 40 to 60 g. per kg. of air. (4,5).

2. Effects of sauna bathing on the cardiovascular system

Sauna bathing has a significant impact on cardiovascular health. This is evidenced by one of Earric Lee's recent 2022 studies, which analyzed the effects of sauna bathing combined with and exercise on the cardiovascular system. The study included 48 participants who were assigned to three groups of 16 each: EXS (exercise + sauna), EXE (exercise only) and CON (control group). The entire study period lasted 8 weeks, during which cardiovascular disease (CVD) risk factors were examined. The results showed that both systolic blood pressure (SBP) and total cholesterol (TC) were lower in the EXS group than in the EXE group. For the EXS group, SBP decreased from 134 mmHg to 126 mmHg, and TC decreased from 200 mg/dl to 188 mg/dl. In contrast, for the EXE group, SBP remained at 134 mmHg and TC increased from 203 mg/dl to 208 mg/dl. The results suggest that the EXS group has a reduced risk of CVD (6). The positive effects of sauna use were also demonstrated in a 20.7-year study of 2315 men aged 42-60. It proved that regular sauna use significantly reduces the risk of sudden cardiac death (SCD), coronary heart disease (CHD) and death from cardiovascular disease (CVD). Three groups using sauna at different frequencies (1, 2-3 and 4-7 times a week) were compared. In the group using the sauna most often, the risk of SCD was 5.0%, while in the group using it the least often, it was 10.1%. Similar results were reported for CHD, CVD and overall mortality. The study indicates that more frequent sauna use may significantly reduce the risk of death from cardiovascular causes (7). Two more recent studies have confirmed this relationship, however they compared the effects of cardiorespiratory fitness (CFR) and frequency of sauna use (FSB) on the risk of sudden death. The study found that the combination of high CFR and FSB resulted in lower rates of cardiovascular mortality, SCD and mortality from any cause compared to high CRF or high FSB. These findings suggest that the combination of good cardiorespiratory fitness and regular sauna bathing may provide greater cardiovascular health benefits than either alone (8,9). In addition, Tanjaniina Laukkanen's research has shown that even short, 30-minute sauna baths have a beneficial effect on the cardiovascular system. A decrease in blood pressure, improved arterial elasticity and a temporary increase in blood cell parameters such

as hemoglobin levels, leukocyte and platelet counts were observed. These effects may contribute to long-term protection against arterial stiffness and reduced risk of cardiovascular disease and mortality, as shown in the studies we cited earlier (10). Studies on the effects of sauna bathing show that regular use has numerous benefits for cardiovascular health. They prove that regular use, has numerous benefits for cardiovascular health. In addition, some show that saunas increase left ventricular ejection fraction and shorten ejection time. In addition, saunas improve vascular endothelial function, as manifested by an increase in the number of circulating endothelial progenitor cells (CD34+) and improved flow-dependent vasodilation (FMD) (11–13). Other studies have shown that repeated sauna bathing improves vascular endothelial function by increasing the production of nitric oxide (NO), which acts to dilate blood vessels, inhibit platelet aggregation and slow the development of atherosclerosis. In addition, sauna baths lowered systolic blood pressure and urinary 8-epi-PGF2 α levels, indicating a reduction in oxidative stress associated with atherosclerosis risk. Thus, sauna may have a protective effect on the cardiovascular system and help prevent diseases such as atherosclerosis (14).

What's more, studies have proven that sauna use has a positive effect on the lipid profile, leading to a significant reduction in both total cholesterol and the LDL cholesterol fraction, which benefits cardiovascular health and prevents the development of diseases such as atherosclerosis and hypertension (6,15,16).

3. Effect of sauna bathing on blood pressure

Research on sauna bathing shows positive effects on blood pressure, as confirmed by a study by Tanjaniina Laukkanen and Earric Lee involving 102 Finnish participants without cardiovascular symptoms, but with at least one cardiovascular risk factor (e.g., smoking, hypertension, obesity). Participants were subjected to a 30-minute sauna session, with a 2-minute warm shower break after 15 minutes. After the session, baseline vital signs were measured, including blood pressure. SBP averaged 137 mmHg before the sauna session, 130 mmHg immediately after, and 130 mmHg after 30 minutes of rest. Diastolic blood pressure (DBP) values were 82 mmHg before, 75 mmHg after the sauna bath, and 81 mmHg after a 30-minute rest, respectively, suggesting that sauna bathing may have health benefits for patients with cardiovascular risk factors (10,12). A more recent 2019 study, also conducted on participants without a heavy health history, found similar results. After a 25-minute sauna session, a significant decrease in both SBP and DBP was observed, both immediately after

the sauna bath and after a 30-minute rest period (17). Most studies have focused on analyzing the effects of saunas on people with a heavy cardiovascular history. One example is Amelia Debray's 2023 study, which analyzed a group of 41 participants with stable coronary artery disease who used saunas for 8 weeks (an average of 21.3 sessions per week, each lasting 20-30 minutes). Before and after the intervention, parameters such as blood pressure, flow-dependent brachial artery dilation (FMD) and carotid-femoral pulse wave velocity were measured. The results indicated that the 8-week intervention did not improve markers of vascular health, but the researchers emphasize the need for further studies to investigate a possible physiological adaptation that may reduce the risk of cardiovascular death in chronic sauna users (18). Another example of this type of research is the work of Setor K. Kunutsor. They use a much more extensive study, using data from a region in Kuopio, eastern Finland, and include a group of 2,575 men with a 27.8-year follow-up. These studies have shown that there is an interaction between SBP and sauna bathing, paving the way for further research. In addition, it has been shown that regular sauna use can counteract the negative effects of elevated blood pressure on mortality risk (19).

A 2017 study involving 1,621 men, with a follow-up period of 24.7 years, reported a total of 251 incident hypertension cases, including 66 cases in those who used saunas once a week, 166 in those who used saunas 2-3 times a week, and only 19 cases in those who used saunas 4-7 times a week. Researchers stress that regular sauna use is associated with a lower risk of incident hypertension (20). Many studies, both on smaller groups of participants (14,17,21,22), and on large study groups analyzed in long-term follow (20), show that sauna use can lead to significant reductions in SBP and DBP. Yet despite the promising results, this topic requires further exploration to better understand the mechanisms of action and long-term health effects of saunas.

4. Effect of sauna bathing on respiratory diseases

Sauna through high temperature and high humidity expands the respiratory tract, aiding breathing and relieving symptoms of some respiratory diseases (23–25). This is confirmed, among other things, by a study by Setor Kwadzho Kunutsor, in which the effects of saunas on respiratory diseases such as chronic obstructive pulmonary disease (COPD), asthma or pneumonia were studied on a group of 1,935 men aged 42-61 over a period of 25.6 years. Participants were divided into three groups based on the frequency of sauna use (1, 2-3 and 4 times a week). The final results of the study showed that those who used the sauna 2-3 times

a week had a 28% lower risk of pneumonia, and those who used it 4 times a week had as much as a 37% lower risk [table 1] (24,26).

Frequency of sauna use	Risk ratio (HR) for respiratory diseases	Reduction in risk of respiratory diseases (%)	Risk ratio (HR) for pneumonia	Reduction in risk of pneumonia (%)
1 time a week	1.00 (reference)	0 %	1.00 (reference)	0%
2-3 times a week	0,73	27%	0,72	28%
4 times a week	0,59	41%	0,63	37%

Table 1. Percentage reduction in the risk of respiratory diseases and pneumonia depending on the frequency of sauna use.

Other studies indicate that high-sensitivity C-reactive protein (hsCRP) and FSB may also affect the risk of pneumonia. In a prospective cohort study involving 2264 men aged 42-61 years, serum hsCRP levels were measured and sauna use habits were assessed. During a 26.6-year follow-up, 528 cases of pneumonia were recorded. The results showed that high hsCRP increased the risk of pneumonia by 30% (HR = 1.30), while high FSB was associated with a 21% reduction in the risk of pneumonia (HR = 0.79) (25). In addition, a 2021 study found that combining regular sauna bathing with physical activity can reduce the risk of pneumonia by 38% (27).

Regular use of the sauna can have a beneficial effect on obstructive lung diseases such as COPD and asthma (28–30). Setor K. Kunutsor and Jari A. Laukkanen, in a 2022 study of the KIID population (2682 men aged 42-61), evaluated the effect of saunas on the risk of COPD. The results showed that men who used the sauna 3-7 times a week had a 43% lower risk of COPD than those who used it a maximum of twice a week (HR = 0.57). After

accounting for additional factors such as genetics, comorbidities, occupational exposures and air pollution, the risk of COPD in those who used the sauna 3-7 times a week was still 38% lower than those who used it a maximum of twice a week (HR = 0.62), confirming the protective effect of sauna use. It is also interesting to note that non-smokers had a 47% lower risk of COPD and smokers had a 35% lower risk of COPD compared to less frequent sauna users, suggesting that regular sauna use may significantly promote lung health, regardless of smoking habits (30). In addition, some studies suggest that sauna use not only reduces the risk of chronic obstructive pulmonary disease (COPD), but may also improve lung function and reduce pulmonary hypertension, which is often associated with an unfavorable prognosis for COPD (31–34). Regular sauna use benefits lung health by reducing the risk of chronic obstructive pulmonary disease (COPD) and pneumonia. Sauna improves lung function regardless of smoking habits, suggesting its role as a supportive treatment for respiratory diseases.

5. Effects of sauna bathing on the urinary system

Sauna bathing is safe for patients with kidney disease and does not increase the risk of kidney disease, a 2023 study using the KIHD population (2682 men aged 42-61) confirmed. Analysis of the data showed that there were no significant changes in renal function or significant differences in glomerular filtration rate (GFR), creatinine and serum sodium (Na) levels in the group of participants using saunas 4-7 times a week, compared to the group using saunas less frequently. In addition, no increased incidence of chronic kidney disease (CKD) was observed among regular sauna users (35). In addition, research by Pablo Maggiani-Aguilera, showed that stimulated sweating, using a portable sauna, proved to be an effective and safe way to reduce fluid overload in patients undergoing peritoneal dialysis. The intervention led to significant changes in conductivity, which decreased from 6.3 ± 1.2 liters to 5.5 ± 1.3 liters. In addition, weight reduction, lower blood pressure and improved sleep quality were observed among patients using the portable sauna (36). Thus, regular sauna use may not only support kidney health, but also improve patients' overall well-being, highlighting the need for further research in this area.

6. Effects on the rheumatoid system

A 2018 study by Fredrikus GJ Oosterveld on the use of sauna in the treatment of patients with rheumatoid arthritis (RA) and ankylosing spondylitis (AS) evaluated the effect of heat sessions on reducing pain, stiffness and fatigue. The study included patients with stable chronic disease whose health status had not changed significantly in the previous three

months. After sauna therapy, RA patients' pain decreased by 40% and stiffness by 50%. In patients with AS, pain decreased by 60% and stiffness by 60%, indicating significant clinical improvement. In addition, 88.2% of participants showed an improvement in well-being and well-being (37). These findings are consistent with other studies that have also confirmed the beneficial effects of sauna on pain relief in people with RA (38).

7. Applications

A review of the literature on sauna use indicates its positive effects on health, particularly in the context of the cardiovascular, respiratory and urinary systems. Regular sauna sessions show the ability to lower blood pressure, improve lipid profile and increase overall cardiovascular fitness, which may contribute to reducing the risk of cardiovascular disease. In addition, the benefits of sauna are also seen in terms of lung health, reducing the risk of chronic respiratory diseases.

Sauna bathing is considered safe for people with kidney disease, opening up new therapeutic options for patients with this type of condition. Therefore, regular sauna use can be a valuable part of preventive health care and rehabilitation.

Further research is recommended to better understand the mechanisms of sauna and its effects on different patient groups, and to confirm the health benefits in long-term studies. Incorporating saunas into regular health and rehabilitation programs can help improve the quality of life and well-being of the population.

Disclosure

Author's contribution

Conceptualization: R. Łagowski; methodology: J. Kosęda; software: J. Fordymacki; check: J. Fordymacki; formal analysis: R. Łagowski, J. Kosęda; investigation: R. Łagowski, J. Kosęda, J. Fordymacki; resources: R. Łagowski, J. Kosęda, J. Fordymacki; data curation: R. Łagowski, J. Fordymacki; writing-rough preparation: R. Łagowski, J. Kosęda; writing-review and editing: R. Łagowski, J. Kosęda, J. Fordymacki; visualization: R. Łagowski, J. Kosęda; supervision: R. Łagowski; project administration: R. Łagowski

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Conflict of interest

Authors declare no conflict of interest.

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