Publisher
Maharshi Charaka Ayurveda
www.maharshicharaka.in

E-ISSN:2456-3110

Journal of Ayurveda and Integrated Medical Sciences

2025 Volume 10 Number 6 JUNE

Review Article

Human System

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Physiological effect of Sauna Bath on Human System - A Systemic Review

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DOI:10.21760/jaims.10.6.17

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Introduction: Hydrotherapy and sauna bathing have shown significant benefits in various pathologies and medical rehabilitation. Sauna therapy has been proven to improve cardiac activity, endothelial function, and myocardial perfusion, and reduce ventricular arrhythmias, making it a safe and effective treatment for patients with cardiovascular, respiratory, and musculoskeletal conditions.

Methodology: The investigators utilized PubMed and PubMed Central to search for articles related to the effects of Sauna Bath or Sauna Bathing on the Cardiovascular System, Insulin, or Health, resulting in 18 relevant references from the last decade; only English clinical trials and Randomized controlled trials focusing solely on Sauna Bath or Sauna Bathing were considered, while studies combining these interventions with other Naturopathic approaches were excluded.

Results: Sauna therapy has demonstrated efficacy in enhancing various aspects of human physiology, particularly in cardiovascular, respiratory, and musculoskeletal health, making it a safe and effective intervention for patients with different medical conditions. Different types of saunas, such as traditional saunas and far-infrared saunas, offer unique benefits and have shown promising results in improving cardiovascular health, reducing mortality risk, and potentially enhancing overall well-being through various physiological mechanisms.

Conclusion: In patients with blocked coronary arteries, sauna bathing improves myocardial perfusion. Heart failure patients experience reduced arterial stiffness after thermal treatment. Regular exercise enhances body composition and cardio-respiratory fitness in individuals at risk of cardiovascular disease.

Keywords: Naturopathy, Hydrotherapy, Sauna Bath, Cardiovascular diseases, Insulin, Health

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How to Cite this Article

Yajurvedi SR, Uchagaonkar MP, Prajwal HM, Vineetha AN, Shetty VS, Physiological effect of Sauna Bath on Human System - A Systemic Review. J Ayu Int Med Sci. 2025;10(6):123-127.
Available From
https://jaims.in/jaims/article/view/4464/

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Manuscript Received	Review Round 1	Review Round 2	Review Round 3	Accepted
2025-05-11	2025-05-27	2025-06-07	2025-06-17	2025-06-27

Conflict of Interest	Funding	Ethical Approval	Plagiarism X-checker	Note
None	Nil	Not required	12.32	

Introduction

Naturopathy often incorporates sauna baths as a therapeutic modality due to their potential health benefits. Sauna bathing has been shown to positively impact human physiology, including cardiovascular health, endurance, and mental well-being.**[1]**

Sauna bathing is practice that has gained popularity due to its numerous health benefits. Research indicates that sauna therapy positively impacts various pathologies, improving cardiac activity, endothelial function & musculoskeletal conditions. **[2]** Sauna bathing has been deeply rooted in Finnish culture for leisure and relaxation, showing significant health benefits like reducing incidence of vascular & nonvascular diseases, improving musculoskeletal disorders & increasing lifespan.**[3]** Different types of saunas exist, each offering unique benefits, such as traditional saunas, far-infrared saunas, infrared lamp saunas & steam saunas.**[4]** Sauna use has shown promising results in improving cardiovascular health, reducing cardiovascular mortality, hypertension risk & dementia incidence, making it valuable adjunct in treating chronic diseases.**[5]** Additionally, sauna bathing has displayed positive effects on human physiology, including improved thermoregulation in diabetics, reduced hemoglobin A1C levels, & potential neuroprotective benefits through increased heat shock protein expression.**[6]** Integrating sauna baths into naturopathic treatments can offer holistic approach to promoting overall health & well-being.

Methodology

The online database, PubMed and PubMed Central were searched for citations for keywords "Sauna Bath" OR "Sauna Bathing" and "Cardiovascular system" OR "Insulin" OR "Health". The search yielded a total of 18 references from past 10 years. Clinical trials and Randomized controlled trials in English, revealing effects of Sauna Bath OR Sauna Bathing were included in review. The studies that had used Sauna Bath OR Sauna Bathing in combination with other Naturopathic interventions were excluded. Studies in languages other than English, and whose abstracts were unavailable were excluded from review. After applying inclusion and exclusion criteria and removing duplicates, a total of 5 studies were selected for final review.

Results

According to a study done in 2019-2020, The study revealed that sauna treatment enhanced exercise tolerance and endothelial function in chronic heart failure patients. Sauna therapy also improved myocardial perfusion in patients with chronically occluded coronary arteries. Thermal therapy reduced arterial stiffness in chronic heart failure patients. Heat stress increased arterial stiffness in smokers and non-smokers. Gender differences in arterial stiffness at rest and after exercise were noted. Sauna baths had cardiovascular effects on healthy men, impacting heart rate and blood pressure. Infrared sauna health effects were due to thermoregulatory adaptations, not exercise-related responses. The study emphasizes the need for nuanced evaluation of passive heat clinical studies. Overall, sauna therapy and passive heat stress show potential cardiovascular health benefits.**[7]**

According to a study done in Feb 2020, The study examined cardiovascular reactions of HPTT and WT in healthy men, finding significant increases in HR, TT, PFV, AFV, and BA diameter during HPTT. In WT, HR and TT increased during warming but decreased during heat-retention, with equal dilation of BA diameter in both therapies. Vasodilatory response and afterload reduction were similar in HPTT and WT, suggesting potential usefulness for heart failure patients.**[8]**

According to study in 2022, Regular exercise enhanced cardiorespiratory fitness & body composition in sedentary adults with cardiovascular disease risk factors. Sauna bathing, when combined with exercise, had additional benefits on CRF, systolic BP, & total cholesterol levels. Participants in exercise & sauna bathing group experienced greater improvements in CRF & lower systolic BP compared to those in exercise-only group. Sauna bathing also led to reduced total cholesterol levels in comparison to exercise alone.**[9]**

According to a study in 2014-2015, The WBC and DS procedures both increased SOD and GPx activity, showing reactive oxygen species formation and imbalance in the oxidant-antioxidant system. WBC induced higher SOD activity than DS. WBC showed a negative correlation between GPx activity and TBARS concentration, suggesting an antioxidant effect. DS led to increased SOD and CAT activities, indicating an antioxidant response.

Sauna baths & cryo-stimulation slightly disrupt oxidant-antioxidant balance, aiding long-term adaptation of organism. Both procedures cause oxidat. stress & impact oxidant-antioxidant balance in male volunteers. Additional research is required to validate these results.**[10]** According to study done in 2016, Waon therapy had safety & efficacy advantages for advanced heart failure patients.

The therapy improved heart failure symptoms and cardiothoracic ratio. BNP ratio did not show statistical significance, but BNP levels decreased significantly. No serious adverse events were observed in either group. Minor adverse events included blood pressure decrease and bleeding after tooth extraction. Waon therapy was superior to medical therapy in safety and efficacy.**[11]**

Table 1: Description of articles included in this review

SN	Title	Author & Year	Assessment	Conclusion
1.	Physiological responses to infrared sauna vs exercise in healthy women: A randomized controlled crossover trial.[7]	Joy N. Hussain, Marc M. Cohen, Nitin Mantri, Cindy J. O'Malley, Ronda F. Greaves. August 2019 - March 2020	▪ Vital signs ▪ Thermal measurements, ▪ Blood Pressure ▪ Pulse Wave Analysis (PWA), and ▪ Heart rate variability (HRV).	The results of this study suggest the health effects of infrared sauna are driven by thermoregulatory adaptations, more so than exercise mimetic hemodynamic, respiratory, or cardiac ANS responses
2.	Cardiovascular reactions for whole-body thermal therapy with a hot pack and Waon therapy[8]	Kazuyuki Kominami, Kazuki Noda, Naoaki Takahashi, Tadashi Izumi & Kazuya Yonezawa, 11 Feb 2020.	▪ Tympanic temperature, ▪ Brachial artery diameter, ▪ Radial artery blood velocity Autonomic activity	We tested the use of HPTT and elucidated the cardiovascular effects of HPTT in normal healthy subjects. The vasodilatory response and afterload reduction following HPTT are similar to those following WT. This result suggests HPTT is potentially useful for heart failure patients.
3.	Effects of regular sauna bathing in conjunction with exercise on cardiovascular function: a multi-arm, randomized controlled trial[9]	Earric Lee, Iiris Kolunsarka, Joel Kostensalo, Juha P. Ahtiainen, Eero A. Haapala, Peter Willeit, Setor K. Kunutsor, and Jari A. Laukkanen, Received 2022 Apr 13; Revised 2022 Jun 27; Accepted 2022 Jun 29	▪ Maximal oxygen consumption (V̇o2), ▪ SBP, and ▪ Total cholesterol levels	Regular exercise using the recommended guidelines three times a week, for 50 min each time, can effectively improve CRF and body composition. The addition of a regular 15-min typical Finnish sauna after exercise supplemented the gains in CRF, reductions in SBP, and lowered total cholesterol levels considerably. Future research should adopt a more systematic approach in the study of heat exposure and seek to understand the optimal exposure durations, frequencies, modalities, and temperatures for various beneficial adaptation
4.	Single Whole-Body Cryo-stimulation Procedure versus Single Dry Sauna Bath: Comparison of Oxidative Impact on Healthy Male Volunteers[10]	Pawe B Sutkowy, Alina Wofniak, Pawe B Rajewski, Received 22 May 2014; Revised 29 July 2014; Accepted 26 August 2014	▪ Thiobarbituric acid reactive substances (TBARS) Measurement ▪ Anti-oxidant enzymes (SOD, CAT, and GPx) Measurement	A single whole-body cryostimulation procedure and a single dry sauna bath probably induce the formation of reactive oxygen species in the organisms of healthy men and, therefore, disturb the oxidant-antioxidant balance.
5.	Waon Therapy for Managing Chronic Heart Failure – Results From a Multicenter Prospective[11]	Chuwa Tei, MD; Teruhiko Imamura, MD; Koichiro Kinugawa, MD; Teruo Inoue, MD; Tohru Masuyama, MD; Hiroshi Inoue, MD; Hirofumi Noike, MD; Toshihiro Muramatsu, MD; Yasuchika Takeishi, MD; Keijiro Saku, MD; Kazumasa Harada, MD; Hiroyuki Daida, MD; Youichi Kobayashi, MD; Nobuhisa Hagiwara, MD; Masatoshi Nagayama, MD; Shinichi Momomura, MD; Kazuya Yonezawa, MD; Hiroshi Ito, MD; Satoshi Gojo, MD; Makoto Akaishi, MD; Masaaki Miyata, MD; Mitsuru Ohishi, MD; WAON-CHF	▪ Systolic Blood Pressure, ▪ Heart Rate, ▪ Serum creatinine ▪ LVDd, ▪ LVEF, ▪ LAD, ▪ CTR	Waon therapy, a holistic soothing warmth therapy, was demonstrated to have advantages over optimal medical therapy alone in terms of safety and efficacy even in patients with advanced HF.

Safety and Efficacy:

However, it is essential to be aware of potential risks associated with sauna bathing, such as injuries from slips/falls and dizziness/syncope, which can be prevented through personal behavior adjustments and safety regulations.**[12]**

Conclusion

Research indicates that in patients with blocked coronary arteries, sauna bathing enhanced myocardial perfusion. Patients with heart failure had less arterial stiffness after receiving thermal treatment. Research indicates that there are notable increases in HR, TT, PFV, AVF, and BA diameter during HPTT and WT in healthy men. Regular exercise has also been shown to improve body composition and cardio-respiratory fitness in inactive persons with cardiovascular disease risk factors. When paired with exercise, it provided additional effects on cholesterol, systolic blood pressure, and CRF. The oxidant-antioxidant balance is slightly upset by sauna baths and cryo-stimulation, which helps organism adapt over long run. Patients with advanced heart failure could benefit from its safety and effectiveness. The therapy improved heart failure symptoms & cardiothoracic ratio.Integrating sauna baths into naturopathic treatments can offer holistic approach to promoting overall health and well-being.

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