Exploring the clinical effects of repeated dry sauna bathing – a systematic review

Dr Joy Hussain – PhD scholar
RMIT University, Australia
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Systematic Review of Sauna Literature

Inclusion Criteria:
- English language
- Jan 2000 – April 2017
- Humans

Exclusion Criteria:
- wet/steam sauna
- hydrotherapy
- partial body
- sauna as location
- animal-based
- single session sauna
- case reports/ case studies

40 Studies of the Systematic Review

- 13 RCTs
- 2 large prospective cohort studies
- 3/13 RCTs with low overall risk of bias\(^1\)\(^-\)\(^3\)
- Most studies with \(n<40\)


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Results: health effects of sauna

- 38/40 studies reported beneficial health effects

- 2010 Pach et al. reported negligible health benefits (n= 157)\(^a\)

- 2013 Garolla et al. reported adverse health effect of impaired male spermatogenesis, reversed after 6 months of ceasing sauna activity (n= 10)\(^b\)


Adverse side effects

- 8/40 studies reported on adverse side effects (all mild – moderate in level):
  - heat discomfort & intolerance (especially CFS/ME, chronic pain, rheumatoid arthritis, ankylosing spondylitis populations)
  - light-headedness (low blood pressure)
  - transient leg pain
  - airway irritation
  - claustrophobia

- NO REPORTS OF SEVERE ADVERSE EVENTS!
Main research highlight - CVD

**Laukkanen et al. 2015, 2016 cohort studies**

1. 40% reduced risk of all-cause mortality (men, if sauna 4–7 x/wk)
2. 63% reduced risk of sudden cardiac death (men, if sauna 4–7 x/wk)
3. 66% reduced risk of dementia (men, if sauna 4–7 x/wk)

**Tei et al. 2016 multi-centre RCT**

4. Significant improvements compared to control (p<0.05) in 6-min walking distances, reduced CTR (measure of heart enlargement), improved NYHA classification after 2 weeks of infrared sauna protocol.

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1. HR (hazard ratio) = 0.60, 95% CI (confidence interval): 0.46–0.80, p<0.001 from Laukkanen et al., “Association between sauna bathing and fatal cardiovascular and all-cause mortality events”, JAMA Internal Medicine, vol.175, no.4, pp.542–548, 2015.
2. HR = 0.37, 95% CI: 0.18–0.75, p=0.005 from Laukkanen et al., “Association between sauna bathing and fatal cardiovascular and all-cause mortality events”, JAMA Internal Medicine, vol.175, no.4, pp.542–548, 2015.
3. HR = 0.34, 95% CI: 0.16–0.71, p=0.004 from Laukkanen et al., “Sauna bathing is inversely associated with dementia and Alzheimer’s disease in middle-aged Finnish men”, Age and Ageing, 2016.
Other remarkable results

- **2015 Kanji et al.** – RCT, n = 37; 44% reduction in headache intensity within 6 weeks of 8 week sauna intervention group (decrease of 1.27 pts with 95%CI: 0.48–2.07; p=0.002).

- **2013 Kunbootsri et al.** – RCT, n = 26, improvement of 43 L/sec peak nasal inspiratory flow rates (p=0.002) and 18.1% improvement in FEV₁ (p=0.002) after 6 weeks in sauna group.

Other remarkable results

- **2008 Kowatzki et al.** – n= 41; decreases in NaCl sweat concentrations (change of 30 mmol/L +/- 10 mmol/L, p=0.0167); 25% lower pre-sauna forehead sebum levels (p<0.05); and more acidic skin surface pH in regular sauna bathers compared with newcomer sauna bathers.*

- **2009 Hüppe et al.** – RCT, n = 36; improvements in somatic well-being scores in both sauna groups compared with control group. (p< 0.01 –0.05); no changes in serum organochloride levels.


Clinical Health Effects – Repeat Sauna Bathing

Cardiovascular benefits

- Association with cardiovascular benefits on many levels
- Both traditional and infrared saunas

Adverse effects

- More study – male spermatogenesis ≠ male fertility
- Intolerance more common in CFS/ME, RA, AS

Sweating

- Further analysis of sweat
- Skin as organ with excretion mechanisms

Complexity with other hormetic stressors

- Exercise
- Cooling Exposures
- Sauna fitness

Limitations/ Bias

- Need for larger interventional studies
- Need for more demonstrated objective outcome measures

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