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Sauna bathing, health, and quality of life among octogenarian men: the Helsinki Businessmen Study

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Abstract

Background and aim Sauna-type bathing has increased worldwide, and it has been related to both harmful and beneficial effects. There are few studies of bathing in sauna in very old age.

Methods The series consists of 524 mostly home-living survivors of the Helsinki Businessmen Study (HBS, mean age 86 years, range 80–95), who in 2015 responded to a questionnaire survey about lifestyle (including sauna bathing), prevalent diseases, and health-related quality of life (HRQoL, RAND-36).

Results Of the men 57.6% ($n=302$) reported all-year round and 17.6% ($n=92$) part-year sauna bathing. Sauna was currently used mostly once a week, but 10% bathed more than twice a week. Median time in the hot room was 15 min at 80 °C. Among 45.7% of the men, the habit had decreased with ageing, and 130 (24.8%) did not attend sauna. However, 92.2% of the latter had discontinued an earlier habit, respective proportions 20.7% and 75.0% among all-year and part-year users. Overall, reasons for decreased sauna bathing were nonspecific or related to mobility problems or diverse health reasons ($n=63$). The most frequent motivations for sauna were relaxation and hygienic reasons. Of the RAND-36 domains physical function, vitality, social functioning, and general health were significantly better among sauna users than non-users. These differences partly remained after adjusting for prevalent diseases and mobility-disability.

Conclusions Regular sauna bathing was common among octogenarian men and was associated with better HRQoL. However, reverse causality must be taken into account in this cross-sectional study. The bathing habit seemed to be prudent and had decreased in almost half of the cohort.

Keywords Sauna · Lifestyle · Quality of life · Waon therapy · Aged · Health

Introduction

Typical Finnish sauna bathing (<http://www.saunasociety.org/sauna-types/>) includes several short visits (2–20 min) in a relatively dry, hot room heated with a stove covered by hot rocks, interrupted by cooling-off periods and possibly swimming. Typical temperature is 80–100 °C with relative humidity of 10–20%.

Exposure to heat in the form of sauna bathing or hot tub has various cardiovascular and metabolic effects, and it has raised interest in the prevention and treatment of chronic diseases [1–9]. In the past, sauna bathing raised concerns of especially cardiovascular hazards [10–12], but these have been abolished—at least when sauna bathing is “prudent” [13–16], i.e. not too hot, not too long, and not bathing when intoxicated. Paradoxically, recent epidemiologic reports suggest less cardiovascular mortality, hypertension and dementia associated with frequent sauna bathing in midlife [17–19]. These could be explained by beneficial effects of heat in the vasculature, e.g. endothelial [3] and metabolic functions [1, 20], which may be accentuated among older people and cardiovascular patients [8, 9]. In analogy with diet therapy, which can be carried out as a single modification (e.g. fat, protein) or holistically as a pattern (e.g. the Mediterranean diet), instead of legs in a hot tub, heat therapy can be given as sauna bathing which also has social and

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overall well-being dimensions. On the other hand, there are limited data of sauna bathing and relationships to health and disease in people aged 80 years and over.

In the present study, we have studied a large group of men aged 81–96 years, and related their sauna habits to personal characteristics, diseases, and health-related quality of life (HRQoL).

Methods

Participants

The HBS cohort (original $n = 3490$) has been described in detail earlier [21]. HBS consists of white men born between 1919 and 1934 belonging to the highest social strata, with similar socioeconomic status during their working life. HBS has been registered as ClinicalTrials.gov identifier: NCT02526082, and the follow-up has been approved by the ethical committee of the Helsinki University Hospital, Finland.

Since 2000, postal questionnaires about demographics, lifestyle, physician-diagnosed diseases, and medications have regularly been sent to the surviving cohort members. The questionnaire has every time included the RAND-36/SF-36 HRQoL instrument [22], which comprises eight domains: physical functioning (PF), role limitations caused by physical health problems (RP), Role limitations caused by emotional problems (RE), vitality (VT), mental health (MH), social functioning (SF), bodily pain (BP), and general health (GH). scores range from zero to 100, with 100 representing the best level of functioning or wellbeing. A difference of three to five points in the RAND-36 domains is considered to be clinically important [23]. Mobility-disability was defined as reporting a lot of difficulties in walking half a kilometer.

Vital status and addresses have been sought from the Finnish Population Information System Register Centre. The response rate has been satisfactory, although decreasing with ageing of the cohort.

In the 2015 survey, we also included questions about habits of bathing in sauna (frequency, time, and temperature), whether the habit has changed with ageing, and reasons for change. Because in Finland, bathing in sauna may be concentrated in summer months, all-year and part-year sauna bathing were differentiated, but combined in some of the analyses. The present analytic cohort consisted of all those 524 men, 92% of them home-living, who reported their sauna bathing habits in the 2015 survey.

Statistical analyses

Analysis of covariance (ANCOVA, trend test) was used where appropriate to compare continuous variables [mean with standard deviation (SD) or standard error (SE)] across sauna bathing groups. Chi-square and trend tests were used to compare proportions. Logistic regression was used to investigate independent relationships with sauna bathing, these results are presented as odds ratios (OR) with their 95% confidence intervals (CI). In statistical analyses two-sided p values are given. The statistical software NCSS (version 2004, <http://www.ncss.com>, Kaysville, UT, USA) was used for the statistical analyses.

Results

General characteristics of the cohort according to sauna habits are shown in Table 1. Mean age of the cohort was 86.4 years (range 80–96 years), those avoiding sauna bathing being on the average 1 year older, and they tended to consume less alcohol. The men with current habit of sauna bathing reported more often regular weekly exercise and had less heart failure and musculoskeletal disorders. Otherwise, there were no significant differences in lifestyle or diseases, including coronary artery disease, arrhythmias, or pulmonary diseases. In the age-adjusted logistic regression analyses, reported heart failure, musculoskeletal disease, or mobility-disability were associated with higher odds of not using sauna 2.3 and 1.7 and 2.5-fold, respectively (OR 2.3, 95% CI 1.4–3.8; 1.7, 95% CI 1.2–2.6; 2.5, 95% CI 1.4–4.3).

Although cross-sectionally 24.8% reported not currently visiting sauna, 92.2% of them had decreased an earlier habit. A decrease was also observed in 20.7 and 75.0% of all-year and part-year sauna bathers, respectively. Overall, reasons for decreasing sauna bathing were nonspecific or related to mobility problems, and only one-third ($n = 63$) reported some reason(s) related to health or disease. The most frequent motivations for sauna bathing were relaxation and hygienic reasons.

Relationships between HRQoL and sauna bathing are shown in Table 2. Of the RAND-36 scales, not bathing in sauna was significantly associated with age-adjusted lower values in physical function, vitality, social functioning, and general health. Further adjustment for diseases did not materially change the relationships. Differences in physical function and vitality also prevailed after adjusting for mobility-disability. Notably, mental health or perceived pain were not related to sauna bathing.

Table 1 Characteristics of the analytical cohort according to sauna bathing in 2015

Variable ^a	All <i>n</i> = 524	Sauna bathing			<i>P</i> value for difference between groups
		Regular all year round, <i>n</i> = 302	Part of year, <i>n</i> = 92	None, <i>n</i> = 130	
Age (year)	86.4 (0.2)	86.1 (0.2)	86.1 (0.3)	87.1 (0.3)	0.015
Home-living	501 (95.6)	286 (94.7)	89 (96.7)	116 (89.2)	0.055
Mobility-disability ^b	65 (12.4)	28 (9.3)	9 (9.8)	28 (21.5)	<0.001
Good or moderate economic situation	519 (99.0)	299 (99.0)	92 (100)	130 (100)	0.43
BMI, kg/m ²	24.9 (0.3)	25.0 (0.2)	24.8 (0.4)	24.8 (0.3)	0.87
Nonsmokers	505 (96.4)	292 (96.7)	89 (96.7)	124 (95.4)	0.39
Alcohol consumption, gr/week	61.9 (5.5)	59.8 (4.8)	77.0 (8.7)	48.9 (7.3)	0.049
Regular weekly exercise	381 (72.7)	242 (80.1)	63 (68.5)	76 (58.5)	<0.001
None or slight subjective memory disorder	467 (89.1)	271 (89.7)	84 (91.3)	112 (86.2)	0.66
Physician-diagnosed conditions					
Hypertension	273 (52.1)	164 (54.3)	49 (53.2)	60 (46.2)	0.30
Diabetes	86 (16.4)	46 (15.2)	14 (15.2)	26 (20.0)	0.43
Chronic arrhythmia	152 (29.0)	92 (30.5)	26 (28.2)	34 (26.2)	0.65
Coronary artery disease	116 (22.1)	58 (19.2)	20 (21.7)	38 (29.2)	0.067
Stroke or TIA	64 (12.2)	32 (10.6)	15 (16.3)	17 (13.1)	0.34
Heart failure	86 (16.4)	39 (12.9)	13 (14.1)	34 (26.2)	0.002
Pulmonary disease	56 (10.7)	30 (9.9)	10 (10.9)	16 (12.3)	0.76
Cancer	111 (21.2)	56 (18.5)	24 (26.1)	31 (23.8)	0.22
Musculoskeletal disease	175 (33.4)	96 (31.8)	24 (26.1)	55 (42.3)	0.022

BMI body mass index, *TIA* transient ischemic attack

^aContinuous variables are mean (SE), categorical variables are reported as number (%)

^bDefined as a lot of difficulties in walking half a kilometer

Table 2 Health-related quality of life according to sauna bathing habits in 2015

RAND-36 scale	Sauna bathing			<i>P</i> value for difference between groups (trend test)		
	Regular all year round, <i>n</i> = 302 ^a	Part of year, <i>n</i> = 92	None, <i>n</i> = 130 ^a	Age-adjusted	Adjusted for age, heart failure, and musculoskeletal disease	Further adjusted for mobility-disability
Physical functioning	69.9 (1.4)	69.3 (2.5)	54.3 (2.2)	<0.001	<0.001	<0.001
Role limitations caused by physical health problems	61.4 (2.3)	56.7 (4.3)	57.7 (3.6)	0.51	0.52	0.39
Role limitations caused by emotional problems	70.5 (2.1)	69.0 (3.8)	71.6 (3.4)	0.88	0.58	0.26
Vitality	67.0 (1.1)	66.8 (2.0)	57.9 (1.8)	<0.001	0.002	0.011
Mental health	81.6 (0.8)	82.6 (1.5)	79.7 (1.3)	0.32	0.57	0.91
Social functioning	83.5 (1.2)	83.3 (2.2)	75.4 (1.9)	0.0012	0.019	0.069
Bodily pain	78.0 (1.2)	76.1 (2.2)	77.2 (1.9)	0.75	0.29	0.065
General health	57.7 (1.0)	58.1 (1.8)	52.2 (1.6)	0.0093	0.049	0.50

Variables are mean (SE)

Discussion

Sauna bathing was common among octogenarian, mainly home-living Finnish men. Only a quarter of them reported not regularly bathing in sauna. Even among those avoiding sauna, over 90% had had an earlier regular sauna habit. A decrease in sauna bathing was mainly reported to be due to nonspecific reasons or mobility problems, and only 63 men reported reasons attributed to health. In comparison between sauna bathers and non-bathers, heart failure, musculoskeletal diseases, or the presence of mobility-disability were associated with higher odds of not attending sauna anymore. In accordance, items related to physical HRQoL were better among sauna bathers.

Several clinical studies have shown that sauna bathing of the Finnish type, with temperatures 80–100 °C, is safe even for cardiovascular patients without serious conditions such as aortic stenosis [13–16]. This evidently includes that alcohol intoxication or other accident-prone behaviour leading to, e.g. burns [24] is avoided. The present results extend these re-assuring notions in the sense that regular sauna bathing was common among octogenarian men. New epidemiological research even suggests that sauna bathing may have beneficial consequences for ageing populations. In a long-term study, frequent Finnish sauna bathing in midlife was subsequently associated with less hypertension, cardiovascular mortality, and dementia [17–19]. While these associations have aroused international interest in benefits [25], they may simply be due to reverse causality, i.e. “the healthy user effect” may be in play [26, 27]. On the other hand, clinical and experimental studies of heat therapy on vascular function and metabolism demonstrate beneficial effects which could explain the epidemiological findings [3, 6–9, 28]. It is possible, that sauna bathing induces a hormesis effect, i.e. a mild stress response leading to beneficial physiological consequences [29].

Furthermore, Japanese researchers have developed a special form of sauna, “Waon therapy”, which in several studies has shown to be beneficial for heart failure patients [30–34]. In the Waon-type sauna, temperature is milder, 60 °C, and it is dryer than in the traditional Finnish sauna with temperatures 80–100 °C and relative humidity 10–20%. Waon therapy is more “clinical”, and therefore, lacking the social dimensions of traditional Finnish-type sauna bathing, but on the other hand it can be more easily accessible for patients with mobility problems; in our study mobility-disability was strongly associated with not attending sauna. It is interesting to note that in one study Waon therapy improved the same items of HRQoL (physical function, vitality) as observed in our study [34]. However, in these studies the patients have been on the average 60 years of age, and the experience among older heart failure patients is sparse.

Considering the potential benefits for patients with heart failure, it is paradoxical that in our study the presence of this condition was associated with less sauna bathing. A possible explanation is that sauna has been forbidden for these patients by the treating physician. In the light of all evidence, bathing in lower temperatures could be beneficial for persons with heart failure.

Strengths and limitations

The strengths of our study include the homogenous cohort where socioeconomic or cultural factors are not likely to affect sauna bathing. At the same time, the inclusion of Finnish men with heavy cultural tradition for sauna bathing limits the generalizability of the results. Limitations also include the cross-sectional design, and the self-reporting of diseases. The possibility of reverse causality cannot be avoided in a cross-sectional study, and it is possible that those men with good quality of life and good health are more inclined to bathing in sauna. However, follow-up of the cohort is ongoing, and it will be possible to relate sauna bathing to future events.

Conclusions

The results show that regular sauna bathing can be common also in the oldest-old, and if further research confirms clinical benefits, sauna bathing could be developed into a form of therapy to improve health and wellbeing.

Compliance with ethical standards

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Conflict of interest The authors report no conflicts of interest.

Ethical approval The Helsinki Businessmen Study had ethical approval from the Ethics Committee of the Department of Medicine, Helsinki University Hospital.

Statement of human and animal rights All procedures performed in this study involving human participants were in accordance with the ethical approval and standards of the institutional research committee.

Informed consent All participants gave written informed consent.

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