

## The special search strategies

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### 1. MEDLINE

- #1 Search "Balneology"[Mesh]
- #2 Search ((Balneotherapy[Title/Abstract] OR "Health Resorts"[Title/Abstract] OR "Mineral Waters"[Title/Abstract]) OR (Balneotherapy[Title/Abstract] OR Balneology[Title/Abstract]))
- #3 Search "bath therapy"[Title/Abstract] OR "sand bath"[Title/Abstract] OR "sand baths"[Title/Abstract] OR "Psammotherapy"[Title/Abstract] OR "Sauna bath"[Title/Abstract] OR "mud-pack therapy"[Title/Abstract] OR "Waon Therapy"[Title/Abstract] OR "peloid"[Title/Abstract] OR "Warm Bath"[Title/Abstract] OR "chlorhexidine bed-bath"[Title/Abstract]
- #4 Search spa[Title/Abstract] OR "spa therapy"[Title/Abstract] OR "balneological treatment"[Title/Abstract] OR "hydrotherapy"[Title/Abstract] OR "hot spring"[Title/Abstract]
- #5 Search (#1 OR #2 OR #3 OR #4)
- #6 Search "Meta-Analysis" [Publication Type] OR "Systematic Review" [Publication Type]
- #7 Search "Meta-Analysis"[Title/Abstract] OR "systematic review"[Title/Abstract] OR "Meta Analysis"[Title/Abstract]
- #8 Search (#6 OR #7)
- #9 Search (#5 AND #8)
- #10 Search (#5 AND #8) Filters: Publication date from 2000/01/01 Sort by: PublicationDate

### 2. CINHAI

- S1 (MH "Balneology")
- S2 TI ( Balneotherapy OR "Health Resorts" OR "Mineral Waters" OR Balneology ) OR TI ( "bath therapy" OR "sand bath" OR "sand baths" OR "Psammotherapy" OR "Sauna bath" OR "mud-pack therapy" OR "Waon Therapy" OR "peloid" OR "Warm Bath" OR "chlorhexidine bed-bath" ) OR TI ( spa OR "spa therapy" OR "balneological treatment" OR "hydrotherapy" OR "hot spring" )
- S3 AB ( Balneotherapy OR "Health Resorts" OR "Mineral Waters" OR Balneology ) OR AB ( "bath therapy" OR "sand bath" OR "sand baths" OR "Psammotherapy" OR "Sauna bath" OR "mud-pack therapy" OR "Waon Therapy" OR "peloid" OR "Warm Bath" OR "chlorhexidine bed-bath" ) OR AB ( spa OR "spa therapy" OR "balneological treatment" OR "hydrotherapy" OR "hot spring" )
- S4 S1 OR S2 OR S3
- S5 S1 OR S2 OR S3

### 3. Web of Science

- #1 Topic: (Balneotherapy OR "Health Resorts" OR "Mineral Waters" OR Balneology)  
Data base= WOS, BCI, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO, ZOOREC
- #2 Topic: ("bath therapy" OR "sand bath" OR "sand baths" OR "Psammotherapy" OR "Sauna bath" OR "mud-pack therapy" OR "Waon Therapy" OR "peloid" OR "Warm Bath" OR "chlorhexidine bed-bath")  
Data base= WOS, BCI, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO, ZOOREC
- #3 Topic: (spa OR "spa therapy" OR "balneological treatment" OR "hydrotherapy" OR "hot spring")  
Database= WOS, BCI, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO, ZOOREC
- #4 #1 OR #2 OR #3
- #5 Topic: ("Meta-Analysis")  
Data base= WOS, BCI, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO, ZOOREC
- #6 Topic: ("Systematic Review")  
Data base= WOS, BCI, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO, ZOOREC
- #7 Topic: ("Meta Analysis")  
Data base= WOS, BCI, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO, ZOOREC
- #8 #7 OR #6 OR #5  
Data base= WOS, BCI, CCC, DRCI, DIIDW, KJD, MEDLINE, RSCI, SCIELO, ZOOREC
- #9 #9 AND #4
- #10 #9 AND #4
- #11 #9 AND #4

### 4. Ichushi Web

- #1 温泉療法/TH
- #2 温泉療法/TA or 温泉医学/TA or 温泉学/TA or Balneology/TA or Balneotherapy/TA or 浴療法/TA or 入浴/TA or 温泉/TA or 温泉介入/TA
- #3 #1 or #2
- #4 RD=メタアナリシス
- #5 Systematic Review/TA or システムチックレビュー/TA or "システムティック・レビュー"/TA or 系統的レビュー/TA or 系統的考察/TA or 系統的再評価/TA or 系統的総説/TA or 系統的文献レビュー/TA or 系統的文献考察/TA or 体系的レビュー/TA
- #6 メタアナリシス/TA or "meta-analysis"/TA
- #7 #4 or #5 or #6
- #8 #3 and #7
- #9 (#8) and (DT=2000:2019 PT=会議録除く)

### 5. All Cochrane

- #1 MeSH descriptor: [Balneology] explode all trees
  - #2 (Balneotherapy OR "Health Resorts" OR "Mineral Waters" OR Balneology):ti,ab,kw (Word variations have been searched)
  - #3 ("bath therapy" OR "sand bath" OR "sand baths" OR "Psammotherapy" OR "Sauna bath" OR "mud-pack therapy" OR "Waon Therapy" OR "peloid" OR "Warm Bath" OR "chlorhexidine bed-bath"):ti,ab,kw (Word variations have been searched)
  - #4 (spa OR "spa therapy" OR "balneological treatment" OR "hydrotherapy" OR "hot spring"):ti,ab,kw (Word variations have been searched)
  - #5 #1 OR #2 OR #3 OR #4
  - #6 (Meta-Analysis):pt (Word variations have been searched)
  - #7 (Systematic Review):pt (Word variations have been searched)
  - #8 #6 OR #7
  - #9 ("Systematic Review"):ti,ab,kw (Word variations have been searched)
  - #10 ("Meta-Analysis"):ti,ab,kw (Word variations have been searched)
  - #11 ("Meta Analysis"):ti,ab,kw (Word variations have been searched)
  - #12 #9 OR #10 OR #11
  - #13 #5 AND (#8 OR #12)
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**A structured abstract of 18 systematic reviews (Dating from the latest year's paper)**

Reference no.	13
Author (year)	Saquetto (2019)
Title	Water-based exercise on functioning and quality of life in poststroke persons: a systematic review and meta-analysis
Objectives	To investigate the effects of water-based exercise on functioning and QOL in poststroke persons.
Eligibility criteria	To be eligible, the critical trial should have been randomised persons (adult participants with any disability) with stroke to at least 1 group of water-based exercise. The experimental intervention was water-based exercise that consists of exercise protocols against water resistance. The control intervention was land exercise.
Information sources	MEDLINE via PubMed, PEDro, Scielo, Cochrane Library.
Risk of bias	The PEDro scores was adopted. The studies presented moderate methodological quality, due to the lack of blinding of subjects and therapists and the nonperformance of the intention-to-treat analysis.
Included studies	Studies included in qualitative synthesis (n=24). Studies included in quantitative synthesis (n=15).
Synthesis of results	Water-based exercise compared with land exercise had a positive impact on: muscle strength, balance, gait speed and mobility, aerobic capacity, and functional reach. Combined water-based exercise and land exercise was more effective than land exercise for improving balance, gait speed, and functional reach. The meta-analysis showed significant improvement in role limitations due to physical functioning and emotional problems, in vitality general mental health, social functioning, and bodily pain for participants in the water-based exercise and land exercise group versus land exercise group.
Description of the effect	Water-based exercise may improve muscle strength, balance, mobility, aerobic capacity, functional reach, joint position sense, and QoL in poststroke persons and could be considered for inclusion in rehabilitation program.
Strengths and limitations of evidence	Meta-analysis was not performed on only RCTs that investigated the effects of water-based exercise on both functioning and QoL in poststroke persons. The results are not consistent with findings from other SR, because other SRs included nonexperimental and/or quasi-experimental studies and other disease (i.e., Parkinson's disease) .
Interpretation	There is moderate quality evidence that water-based exercise versus land exercise should be considered an effective method of improving muscle strength, balance, mobility and aerobic capacity in poststroke persons. Whereas water-based exercise and land exercise versus land exercise showed improvement in the balance, gait speed, mobility, functional reach, and quality of life. More well-designed, RCTs are necessary to determine the most appropriate methods and specifications (water temperature, depth, exercise intensity, and water-based intervention duration) to tailor water-based exercise to particular characteristics of a person subgroup.
Funding	No funding.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, QoL; quality of life.

Reference no.	14
Author (year)	Bai (2019)
Title	Effectiveness of spa therapy for patients with chronic low back pain: an updated systematic review and meta-analysis
Objectives	To update the meta-analysis of RCTs about the effect of ST on treating CLBP and to examine the effect of ST based on different interventions.
Eligibility criteria	The inclusion criteria were: patients who were diagnosed with CLBP, treated with ST in RCTs, clinical trials whose main objectives included the effectiveness of ST, intervention for ST applied as a combination of BT with physiotherapy, mud-pack, publications in English only. Exclusion criteria were: the mineral water was not natural spring, ST intervention lasted for more than 3 months.
Information sources	Web of Science, EMBASE, MEDLINE via PubMed, Cochrane Library
Risk of bias	Jadad checklist was adopted. Six studies have good quality with only 1 trial having a full score. Other trials showed low quality.
Included studies	Studies included in qualitative synthesis (n=12). Studies included in quantitative synthesis (n=11).
Synthesis of results	When comparing ST with control, there were significant differences in terms of VAS (MD 16.07mm, 95% CI 9.57 to 22.57) and Oswestry disability index (MD 7.12, 95% CI 3.77 to 10.47). No statistically significance was found in Schober test (MD 2.94, 95% CI 0.75 to 6.63).
Description of the effect	ST can benefit pain relief and improve lumbar spine function among patients with CLBP.
Strengths and limitations of evidence	Compared to previous meta-analysis and review publications, the present meta-analysis included more studies, examined more outcome measurements including lumbar spine mobility (Schober test) and lumbar spine function (ODI), and stratified analysis based on different intervention methods. As for limitations, all included studies were only published in English and heterogeneity in results was considerable. And most studies showed methodological flaws resulting in unclear randomization and insufficient double-blind design.
Interpretation	This meta-analysis provides recommendations for future research: more rigorous study design, longer follow-up period, and bigger sample size to provide more convinced evidence in spa therapy to treat CLBP.
Funding	This work was supported by 2012 Chinese Nutrition Society (CNS) Nutrition Research Foundation—DSM Research Fund.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, ST; spa therapy, CLBP; chronic low back pain, VAS; visual analogue scale, MD; mean difference, 95% CI; 95% confidence interval.

Reference no.	15
Author (year)	de Moraes Silva (2019)
Title	Balneotherapy for chronic venous insufficiency
Objectives	To assess the efficacy and safety of balneotherapy for the treatment of people with chronic venous insufficiency (CVI).
Eligibility criteria	Studies were eligible if they were RCT and quasi-RCT comparing BT with no treatment or other types of treatment for CVI. And a combination of treatments was also adopted.
Information sources	Cochrane Vascular Specialised Register, CENTRAL, MEDLINE via Pub mED, EMBASE, AMED, CINAHL, Who-ICTRP, Clinical Trials.gov, LILACS, and IBECS.
Risk of bias	The Cochrane risk-of-bias tool was adopted. The authors judged the overall certainty of the evidence to be very low to moderate.
Included studies	Studies included in qualitative synthesis (n=7). Studies included in quantitative synthesis (n=7).
Synthesis of results	When comparing BT with no treatment, there were significant differences in terms of HR-QoL at 12 months (MD -4.99, 95% CI -9.19 to -0.78) and improved pain (MD -1.23, 95% CI -1.33 to -1.13), and a reduction in incidence of skin pigmentation changes at 12 months (MD -3.59, 95% CI -4.02 to -3.16). There were no significant differences in terms of disease severity signs and symptom score as assessed using the Venous Clinical Severity Score (MD -1.66, 95% CI -4.14 to 0.83) and the incidence of leg ulcers (OR 1.69, 95% CI 0.82 to 3.48). There was no clear effect related to edema between the two groups at 24 days (MD 43.28 mL, 95% CI -102.74 to 189.30).
Description of the effect	BT may result in a moderate improvement in pain, QoL and skin pigmentation changes and has no clear effect on disease severity signs and symptoms score, adverse effects, leg ulcers and edema when compared with no treatment.
Strengths and limitations of evidence	This study reports the available evidence of the effectiveness and safety of BT to allow healthcare professionals and consumers to make informed decisions on treatment methods for CVI, and highlights any uncertainties about this treatment. As for limitations, the scientific evidence is insufficient due to the high risk of bias in most studies and the lack of adequate statistical analysis.
Interpretation	Since most studies reported positive results, for future studies, measurements of outcomes such as disease severity sign and symptom score, quality of life, pain and edema and choice of time points during follow-up must be standardized for adequate comparison between trials.
Funding	No funding.
Registration	The difference between protocol and review was to use odds ratio instead of risk ratio to present the effect estimates.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, HR-QoL; health related QoL, MD; mean difference, OR; odds ratio, 95% CI; 95% confidence interval, CVI; chronic venous insufficiency.

Reference no.	16
Author (year)	Liang (2019)
Title	Effects of water therapy on disease activity, functional capacity, spinal mobility and severity of pain in patients with ankylosing spondylitis: a systematic review and meta-analysis
Objectives	To evaluate the efficacy of water therapy for disease activity, functional capacity, spinal mobility, and pain in patients with AS.
Eligibility criteria	Studies were included if they met the following criteria: (1) the study was an RCT; (2) participants were diagnosed with AS; (3) interventions were water therapy, including hydrotherapy and BT; (4) the study provided at least one of the following clinical outcomes; disease activity, functional capacity, spinal mobility, and pain.
Information sources	MEDLINE via PubMed, Ovid, Web of Science, Cochrane Library, PEDro, CNKI, VIP, Wan Fang, and Open Grey.
Risk of bias	The PEDro scale and the Cochrane risk-of-bias tool was adopted. The authors judged the overall certainty of the evidence to be very low to moderate. Three studies were of good quality, while the other five were of fair quality.
Included studies	Studies included in qualitative synthesis (n=8). Studies included in quantitative synthesis (n=8).
Synthesis of results	Water therapy significantly reduced disease activity (MD -0.48, 95% CI -0.77 to -0.18) and pain (SMD -0.33, 95% CI -0.57 to -0.09). Water therapy did not significantly improve functional capacity (MD -0.23, 95% CI -0.53 to 0.07) and spinal mobility (MD -0.01, 95% CI -0.75 to 0.73).
Description of the effect	Water therapy can benefit patients with AS by reducing disease activity and alleviating pain, but cannot improve functional capacity or spinal mobility.
Strengths and limitations of evidence	There are several RCTs on the effect of water therapy in patients with AS, but their results seem inconsistent with each other. In this study, the authors aim to summarize information about the results of these RCTs. The number of the included studies and patients was small and might not offer enough statistical power to support the result. Besides, the diversity of the interventions and limited language may affect the result.
Interpretation	Due to its analgesic effect both during and after treatment, water therapy remains an alternative for patients with AS when land-based therapy is not well tolerated.
Funding	This work was supported by the National Natural Science Foundation of China (Grant No. 81572231).
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, MD; mean difference, SMD; standardized mean difference, 95% CI; 95% confidence interval, AS; ankylosing spondylitis.

Reference no.	6
Author (year)	Antonelli (2018)
Title	Effects of balneotherapy and spa therapy on quality of life of patients with knee osteoarthritis: a systematic review and meta-analysis
Objectives	To assess if BT and ST can significantly improve QoL of patients with knee OA.
Eligibility criteria	Only RCTs involving patients with knee OA. Only studies in which intervention comprised thermal mineral water immersion, hay baths or mud/peloid pack applications were included. All eligible trials were included regardless of the type of intervention administered to the comparison group.
Information sources	MEDLINE via PubMed, Scopus, Web of Science, Cochrane Library, and PEDro .
Risk of bias	The Cochrane risk-of-bias tool was adopted. The overall risk of bias was evaluated as low for two RCTs, unclear for six RCTs, and high for nine RCTs.
Included studies	Studies included in qualitative synthesis (n=17). Studies included in quantitative synthesis (n=10).
Synthesis of results	When comparing BT and ST interventions with standard treatment, results favored the former in terms of long-term overall QoL (SMD -0.03, 95% CI -1.66 to -0.40). When comparing BT and ST interventions with sham interventions, results favored the former in terms of long-term pain improvement (SMD -0.38, 95% CI -0.74 to -0.02).
Description of the effect	BT and ST can significantly improve QoL of patients with knee OA.
Strengths and limitations of evidence	This is the first SR and meta-analysis investigating the impact of BT and ST on QoL of patients with knee OA. As for limitation, there was heterogeneity in terms of demographic and clinical characteristics of patients, comparison group type, association of BT interventions with non-balneological treatment, scales used to measure the QoL, and difference of patients' perceptions to each translation version of QoL-questionnaires. Moreover, the overall risk of bias of included RCTs tended to be high.
Interpretation	BT and ST may have a role in the reduction of drug consumption and improvement of algofunctional indexes among patients with knee OA.
Funding	No funding.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, ST; spa therapy, OA; osteoarthritis, QoL; quality of life, SMD; standardized mean difference, 95% CI; 95% confidence interval.

Reference no.	17
Author (year)	Källström (2018)
Title	Effects of sauna bath on heart failure: a systematic review and meta-analysis
Objectives	To assemble the evidence through a systematic review and meta-analysis of the effects of sauna bath in patients with heart failure, evaluated by symptoms, blood pressures, biomarkers, cardiac dimensions and function, endothelial function, and mortality.
Eligibility criteria	Studies that met the following criteria were included in the review: (a) RCTs. (b) Population (P=Participant): HF, men and women, ≥16 years of age. (c) Types of sauna bath (I = Intervention): moist (>10% relative humidity), dry (0%-10% relative humidity), or infrared. Temperature of sauna bath: 60 to 100 °C. (d) Sauna bath compared to no sauna bath.(C = Control) Studies comparing different types of sauna baths were excluded. (e) Types of outcome measures (O = Outcome): I) Symptoms and signs: New York Heart Association (NYHA) class, systolic blood pressure (SBP), diastolic blood pressure (DBP); II) Blood biomarkers: B-type natriuretic peptide (BNP); III) Imaging: left atrial diameter (LAD), left-ventricular end-diastolic diameter (LVEDD), leftventricle ejection fraction (LEF), cardiothoracic ratio (CTR), endothelial function. IV) Mortality; V) safety/tolerance.
Information sources	MEDLINE via PubMed, Cochrane Library, CINAHL.
Risk of bias	The quality assessment was done using the Downs and Black checklist. Generally, the risk of bias in the included studies was considered moderate on a scale of 0 to 32 points, each of the studies scoring in the moderate region (11-21 total points).
Included studies	Studies included in qualitative synthesis (n=9). Studies included in quantitative synthesis (n=7).
Synthesis of results	When comparing sauna with control, there were significant differences in terms of B-type natriuretic peptide (MD -124.62, 95% CI -198.09 to -51.14), left-ventricular ejection fraction (MD 1.45, 95% CI 0.55 to 2.35), and cardiothoracic ratio(MD -1.82, 95% CI -2.54 to -1.09).There were no significant differences in terms of blood pressure (SBP) (MD -2.58, 95% CI -5.86 to 0.70), left atrial diameter (MD -0.32, 95% CI -1.51 to -0.88), and left ventricular diameter (MD -1.07, 95% CI -2.20 to 0.07).
Description of the effect	Infrared sauna bath was associated with short-term improvement in cardiac function among patients with HF. There is moderate evidence that infrared sauna bath improves left-ventricular ejection fraction and decreases B-type natriuretic peptide levels and cardiac size.
Strengths and limitations of evidence	This was a comprehensive and first SR, which resulted in a meta-analysis of seven studies including 491 patients with heart failure. As for limitations,since the majority of patients had left-ventricular ejection fraction< 40% in all studies in the meta-analysis, the results are primarily applicable for patients with HF and reduced ejection fraction. Different effects in HF patients with a preserved ejection fraction could be expected as studies have shown that these patients react differently to medical therapies and have a different pathophysiology. The follow-up of the studies in the meta-analysis was relatively short, with a mean duration of 2 to 4 weeks.
Interpretation	The data on effects of sauna bath on SBP, DBP, and left atrial diameter are limited without consistent evidence on the relationship between sauna bath and adaptations in left ventricular end-diastolic diameter. The results of this review highlight the paucity of well-designed large long-term studies of intermittent heat exposure, in particular Finnish saunas, in patients with HF.
Funding	Not described.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, SBP;systolic blood pressure, DBP; diastolic blood pressure, MD; mean difference, 95% CI; 95% confidence interval, HF; heart failure.

Reference no.	18
Author (year)	Yeung (2018)
Title	Aquatic therapy for people with lymphedema: a systematic review and meta-analysis
Objectives	To critically review the existing evidence of potential effects or adverse events of aquatic therapy in the management of lymphedema, and to highlight gaps where more research is warranted.
Eligibility criteria	Studies were eligible if they were RCTs investigating the use of aquatic lymphatic therapy alone or in combination with other treatments for lymphedema, and they reported on one or more of outcome measures. Studies in which lymphedema treatment which did not include aquatic therapy were excluded.
Information sources	MEDLINE via PubMed, EMBASE, CINAHL, Cochrane Library, and PEDro.
Risk of bias	The PEDro scoring was adopted. The overall methodological quality was considered moderate with an average PEDro score of 6.5/10 (range 6–7).
Included studies	Studies included in qualitative synthesis (n=4). Studies included in quantitative synthesis (n=2).
Synthesis of results	When comparing aqua lymphatic therapy with land-based standard care in terms of lymphedema status, there were no significant differences (SMD 0.14, 95% CI –0.37 to 0.64) and upper limb physical function (SMD –0.27, 95% CI –0.78 to 0.23).
Description of the effect	Current evidence indicates no significant benefit of aqua lymphatic therapy over standard land-based care for improving lymphedema status or physical function in people with upper limb lymphedema.
Strengths and limitations of evidence	To date, there has been no systematic compilation of studies that evaluate the efficacy of aquatic therapy as a treatment modality for people with lymphedema. As for limitations, included studies were limited to only English language published RCTs, small sample of women in most studies, use of inconsistent outcome measures, and a lack of long-term follow-up, the lack of a uniform diagnostic definition of lymphedema, and a lack of consistency between exercise protocols used for the rehabilitation of patients.
Interpretation	While both land- and water-based exercise training may benefit patients with lymphedema, aquatic therapy may be a more desirable option for some patients. Current data also suggested that aquatic therapy is a safe alternative mode of exercise modality in the maintenance phase of lymphedema when performed at moderate intensity. Future research is needed to strengthen evidence on the usefulness of aquatic therapy in patients with lymphedema, and to target subgroups of patients who may benefit most from aquatic therapy.
Funding	No funding.
Registration	PROSPERO (CRD42015019900)

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, SMD; standardized mean difference, 95% CI; 95% confidence interval.



Reference no.	19
Author (year)	Rocha Conceição (2018)
Title	Effect of Waon therapy in individuals with heart failure: a systematic review
Objectives	To perform a systematic review about the effect of sauna therapy on VEF, blood pressure, NP, and noradrenaline in patients with HF.
Eligibility criteria	The strategy (participants, intervention, comparison, outcomes, and study type) was: (1) population: patients with HF under standard medical therapy; (2) intervention: Waon therapy; (3) comparison: control group; (4) Outcomes: EF, blood pressure, NP, and noradrenaline; and (5) study type: randomized clinical trials. Any study comparing another intervention associated with Waon therapy was excluded.
Information sources	MEDLINE via PubMed, Scopus, and Bireme.
Risk of bias	Not described.
Included studies	Studies included in qualitative synthesis (n=5). Studies included in quantitative synthesis (n=5).
Synthesis of results	When comparing Waon therapy with control, there were significant differences in terms of brain natriuretic peptide (MD -167.3 pg/mL, 95% CI -225.8 to -108.6), atrial natriuretic peptide (MD -48.7 pg/mL, 95% CI -72.1 to -25.3), systolic blood pressure (MD -6.1 mmHg, 95% CI -10.8 to -1.3) and diastolic blood pressure (MD -4.7 mmHg, 95% CI -8.7 to -0.7). There were no significant differences in terms of EF (MD 1.6%; 95% CI -0.1 to 3.4) and noradrenaline (MD -48.5 pg/mL, 95% CI -99.5 to 2.6).
Description of the effect	The SR showed favorable effects of Waon therapy on NP and blood pressure in patients with HF.
Strengths and limitations of evidence	Complementary and alternative treatments have been proposed for HF, including Waon therapy, a kind of sauna therapy; however, studies have shown divergent results. As for limitations, the studies in this systematic review are limited by lack of blinding and small sample size. The main physiological mechanism of Waon therapy has been proposed to be neurohumoral modulation and, therefore, reverse cardiac remodeling. However, this SR do not totally support this physiological mechanism.
Interpretation	Although side effects were not reported, this SR cannot make a pragmatic recommendation about the use of Waon therapy as an adjunctant intervention in patients with HF. Studies with high-quality methodology and long-term intervention are necessary to better understand the effects of Waon therapy in patients with HF.
Funding	Not described.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, MD; mean difference, 95% CI; 95% confidence interval, EF; left ventricular ejection fraction, NP; natriuretic peptides, HF; heart failure.

Reference no.	20
Author (year)	Bartels (2016)
Title	Aquatic exercise for the treatment of knee and hip osteoarthritis
Objectives	To evaluate the effects of aquatic exercise for people with knee or hip OA, or both, compared to no intervention.
Eligibility criteria	RCTs of aquatic exercise compared to a control group (e.g. usual care, education, social attention, telephone call, waiting list for surgery) of participants with knee or hip OA.
Information sources	Cochrane Library, MEDLINE via PubMed, EMBASE, CINAHL, PEDro and Web of Science.
Risk of bias	The Cochrane risk-of-bias tool was adopted. Only one included trial was at low risk of bias. Nine included trials were at unclear risk of bias, and three trials were at high risk of bias. In conclusion, the evidence presented in this review is based upon high risk of bias of the included studies.
Included studies	Studies included in qualitative synthesis (n=13). Studies included in quantitative synthesis (n=13).
Synthesis of results	When comparing aquatic therapy with control, there were significant differences in terms of pain (SMD -0.31, 95% CI -0.47 to -0.15), disability (SMD -0.32, 95% CI -0.47 to -0.17). and QoL (SMD -0.25, 95% CI -0.49 to -0.01).
Description of the effect	There is moderate quality evidence that aquatic exercise may have small, short-term, and clinically relevant effects on patient-reported pain, disability, and QoL in people with knee and hip OA. The conclusions of this review update does not change those of the previous published version of this Cochrane review.
Strengths and limitations of evidence	OA is a chronic disease characterized by joint pain, tenderness, and limitation of movement. At present, no cure is available. Thus only treatment of the person's symptoms and treatment to prevent further development of the disease are possible. Clinical trials indicate that aquatic exercise may have advantages for people with osteoarthritis. The authors did not find any statistically significant difference when we analyzed this effect for people with hip OA or knee OA alone, which may be due to the low number of studies on aquatic exercise. The long-term effect is unclear due to the paucity of studies.
Interpretation	Further research is needed in order to optimize the use of aquatic exercise to treat the symptoms of people with well established knee and hip OA.
Funding	The Oak Foundation supported this review.
Registration	There were 12 items-difference between protocol (2005) and review. This is an update of a published Cochrane review (2007).

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, OA; osteoarthritis, QoL; quality of life, SMD; standardized mean difference, 95% CI; 95% confidence interval.

Reference no.	21
Author (year)	Xiang (2016)
Title	Clinical efficacy of mudpack therapy in treating knee osteoarthritis: a meta-analysis of randomized controlled studies
Objectives	To evaluate the clinical efficacy of mudpack therapy for the treatment of knee OA and identify the likely factors associated with the high heterogeneity of combined studies.
Eligibility criteria	All RCTs that investigated the clinical efficacy of mudpack therapy in treating knee OA were included in this study. Any studies that investigated other treatments for OA but also contained a mudpack therapy group and a control group were also included. Measures for effects of included studies involved relief of knee pain and improvement of joint function.
Information sources	MEDLINE, EMBASE, and Cochrane Library.
Risk of bias	The modified Jadad quality scale was used to assess the quality of included publications. Four publications were ranked as low quality on the scale and another six publications were ranked as high quality.
Included studies	Studies included in qualitative synthesis (n=10). Studies included in quantitative synthesis (n=10).
Synthesis of results	Meta-analysis of improvement in joint function at the final follow-up visit suggested, given that the follow-up time was less than 4 mos, that the combined effect size (SMD) of four studies was -0.30 (95% CI -0.62 to 0.02) and the difference did not reach the level of statistical significance. When the follow-up time reached 4 mos, the combined effect size (SMD) was -1.10 (95% CI -2.07 to -0.14) and the difference was significant.
Description of the effect	Functional improvement of the knee joint in patients treated with mudpack therapy was not significantly different from that of control subjects at the end of the 4-mo follow-up.
Strengths and limitations of evidence	There are no published meta-analytic studies that draw a definite conclusion concerning the efficacy of mudpack therapy. This meta-analysis that included the latest RCTs systematically assessed the efficacy of mudpack therapy in treating knee OA and analyzed possible reasons underlying the high heterogeneity of combined studies. As for limitations, first, a number of non-English language publications were not included in this meta-analysis, which is likely to cause bias. Second, the standards for evaluating pain and joint function in the original publications were inconsistent, which is a possible reason for heterogeneity. Third, more studies will be needed to perform subgroup analyses to identify the factors causing heterogeneity.
Interpretation	High heterogeneity among the included studies suggested that calculating combined effect size based on these 10 studies was inappropriate. The quality of current publications may be one cause of heterogeneity.
Funding	Not described.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, OA; osteoarthritis, SMD; standardized mean difference, 95% CI; 95% confidence interval.

Reference no.	2
Author (year)	Verhagen (2015)
Title	Balneotherapy (or spa therapy) for rheumatoid arthritis
Objectives	To perform a SR on the benefits and harms of BT in patients with RA in terms of pain, improvement, disability, tender joints, swollen joints, and adverse events.
Eligibility criteria	Studies were eligible if they were RCTs consisting of participants with definitive or classical RA as defined by the ARA, the ARA/ACR or the ACR/EULAR, or by the studies using the criteria of Steinbrocker. BT had to be the intervention under study, and had to be compared with another intervention or with no intervention.
Information sources	Cochrane Library, MEDLINE via PubMed, EMBASE, CINAHL, PEDro, AMED, PsycINFO, WHO-ICTRP.
Risk of bias	The Cochrane risk-of-bias tool was adopted. The overall risk of bias was evaluated as low for two RCTs, unclear for six RCTs, and high for nine RCTs.
Included studies	Studies included in qualitative synthesis (n=9). Studies included in quantitative synthesis (n=4).
Synthesis of results	When comparing mudpack versus placebo mudpacks for hand RA, there were no differences between groups in terms of pain intensity (MD 0.50, 95% CI -0.84 to 1.84), improvement (RR 0.96, 95% CI 0.54 to 1.70) and number of tender joints (MD -0.46, 95% CI -0.82 to -0.48). When comparing mineral baths versus tapwater baths, there was a significant difference between groups in terms of pain intensity at six month follow-up only (MD 9.6, 95% CI 1.6 to 17.6). When comparing BT with HT, land exercise or relaxation therapy, there were no differences in terms of pain (MD 0.05, 95% CI -0.32 to 0.42) and physical disability (MD -0.70, 95% CI -1.50 to 0.10). When comparing BT with drug therapy (Cyclosporin A), there were no differences in terms of pain (MD -8.0, 95% CI -17.54 to 1.54) and swollen joints (MD 1.50, 95% CI -1.25 to 4.25)., but there was a significant difference in terms of the number of tender joints (MD 8.9, 95% CI 3.8 to 14).
Description of the effect	Concerning pain, number of tender joints, response rate, or improvement, no statistically significant differences were found between mudpacks for the hand and placebo mudpacks (very low level of evidence) or for bathing with tapwater over relaxation, exercise or hydrotherapy (very low level of evidence). In terms of pain, some benefits were associated with additional radon in carbon dioxide baths for the treatment of patients with RA, but the clinical relevance of this benefits is small (moderate level of evidence). Regarding all other outcome measures (improvement, disability, tender joints, swollen joints, withdrawal due to adverse events or serious events), the authors conclude that benefits of either form of BT over another is inconclusive.
Strengths and limitations of evidence	No cure for RA is known at present, so treatment often focuses on management of symptoms such as pain, stiffness and mobility. This review, which evaluates the effects of BT in patients with RA, is an update of a Cochrane review first published in 2003 and updated in 2008. As for limitation, most studies showed methodological flaws resulting in high risk of bias. Also, data presentation was often lacking, especially regarding strategies to avoid bias.
Interpretation	Most studies reported positive findings but provided insufficient evidence because of high risk of bias in most studies and absence of an adequate statistical analysis. Therefore large studies with low risk of bias are needed, focusing on appropriate allocation concealment, blinding, and adequate data presentation and analysis.
Funding	No funding.
Registration	This is an updated version from the first review in 2003.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, HT; hydrotherapy, RA; rheumatoid arthritis, ARA; American Rheumatism Association, ACR; American College of Rheumatology, EULAR; European League Against Rheumatism, RR; relative risk, MD; mean difference, 95% CI; 95% confidence interval.

Reference no.	22
Author (year)	Baker (2015)
Title	Effectiveness of aquatic exercise for musculoskeletal conditions: a meta-analysis
Objectives	To investigate the effectiveness of aquatic exercise in the management of musculoskeletal conditions.
Eligibility criteria	The authors searched for RCTs and quasi-RCTs evaluating aquatic exercise for adults with musculoskeletal conditions (OA, RA, fibromyalgia, LBP, osteoporosis) compared with no exercise or land-based exercise. Outcomes of interest were pain, physical function, and QoL.
Information sources	Ovid MEDLINE, CINAHL, EMBASE, and Cochrane Library.
Risk of bias	The PEDro scores were adopted. The median score was 6 out of 10 (range, 4-8), indicating that studies were of high quality. Twenty studies were assessed as being high quality (PEDro score >6).
Included studies	Studies included in qualitative synthesis (n=26). Studies included in quantitative synthesis (n=26).
Synthesis of results	Compared with no exercise, aquatic exercise achieved moderate improvements in pain (SMD -0.37, 95% CI -0.56 to -0.18), physical function (SMD 0.32, 95% CI 0.13 to 0.51), and QoL (SMD 0.39, 95% CI 0.06 to 0.73). No significant differences were observed between the effects of aquatic and land-based exercise on pain (SMD -0.11, 95% CI -0.27 to 0.04), physical function (SMD -0.03, 95% CI -0.19 to 0.12), or QoL (SMD -0.10, 95% CI -0.29 to 0.09).
Description of the effect	Aquatic exercise has moderate beneficial effects on pain, physical function, and QoL in adults with musculoskeletal conditions.
Strengths and limitations of evidence	This review could provide new evidence that aquatic exercise provides moderate benefit to people with musculoskeletal conditions reflected in reduced pain and improved physical function and QoL. There may be a publication bias due to the limited language search and only published studies. In addition, there may be a random error to outcomes because of high-heterogeneity and wide confidence interval of most effect sizes and variability in study quality and exercise interventions.
Interpretation	These benefits appear comparable across conditions and with those achieved with land-based exercise. Further research is needed to understand the characteristics of aquatic exercise programs that provide the most benefit. A strength of this review is the homogenous pool of treatment approaches selected for subgroup analyses, based on the professional expertise in the field of balneology of one of the authors.
Funding	This study was supported by the Arthritis and Osteoporosis Victoria.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, OA; osteoarthritis, QoL; quality of life, RA; rheumatoid arthritis, LBP; low back pain, SMD; standardized mean difference, 95% CI; 95% confidence interval.

Reference no.	23
Author (year)	Bindonde (2014)
Title	Aquatic exercise training for fibromyalgia
Objectives	To evaluate the benefits and harms of aquatic exercise training in adults with fibromyalgia.
Eligibility criteria	Selection criteria were: a) full-text publication of RCT in adults diagnosed with fibromyalgia based on published criteria, and b) between-group data for an aquatic intervention and a control or other intervention.
Information sources	MEDLINE via PubMed, EMBASE, CINAHL, PEDro, Cochrane Library, Dissertation Abstracts, ICTRP, and AMED.
Risk of bias	The Cochrane risk-of-bias tool was adopted. The authors downgraded the evidence due to potential limitations related to imprecision and limitations related to unclear and low risk of bias.
Included studies	Studies included in qualitative synthesis (n=16). Studies included in quantitative synthesis (n=16).
Synthesis of results	As for aquatic versus control, there were statistically significant improvements in all of the major outcomes. Based on a 100-point scale, multidimensional function improved by six units (MD -5.97, 95% CI -9.06 to -2.88), self reported physical function by four units (MD -4.35, 95% CI -7.77 to -0.94), pain by seven units (MD -6.59, 95% CI -10.71 to -2.48), and stiffness by 18 units (MD -18.34, 95% CI -35.75 to -0.93) more in the aquatic than the control groups. The SMD for muscle strength as measured by knee extension and hand grip was 0.63 standard deviations higher compared to the control group (SMD 0.63, 95% CI 0.20 to 1.05) and cardiovascular submaximal function improved by 37 meters on six-minute walk test (95% CI 4.14 to 69.92). As for aquatic versus land-based, there were no statistically significant differences between interventions for multidimensional function, self reported physical function, pain or stiffness: 0.91 units (95% CI -4.01 to 5.83), -5.85 units (95% CI -12.33 to 0.63), -0.75 units (95% CI -10.72 to 9.23), and two units (95% CI -8.88 to 1.28), respectively (all based on a 100-point scale), or in submaximal cardiorespiratory function (three seconds on a 100-meter walk test, 95% CI -1.77 to 7.77). There was a statistically significant difference between interventions for strength, favoring land-based training (2.40 kilo pascals grip strength, 95% CI 4.52 to 0.28).
Description of the effect	Low to moderate quality evidence relative to control suggests that aquatic training is beneficial for improving wellness, symptoms, and fitness in adults with fibromyalgia.
Strengths and limitations of evidence	The effects of aquatic exercise training on fibromyalgia have been investigated in an increasing number of studies since the publication of our last review. In this review, the authors found the role of aquatic exercise training to be beneficial, particularly for fibromyalgia symptoms. They assumed the water allowed for ease of movement and therefore promoted better conditions for exercise. However, the evidence does not yet support a standard aquatic exercise program for individuals with fibromyalgia due to variability in the types of exercise and the wide ranges in intensity, duration, and frequency of exercise recommendations.
Interpretation	There are insufficient studies to allow adequate meta-analysis of the effects of aquatic exercise training compared to land-based interventions and other types of interventions. The evidence for reduction of pain warrants further work; this is the most common symptom complaint in this population. Long-term effects are poorly understood.
Funding	No funding.
Registration	This review is part of the update of the 'Exercise for treating fibromyalgia syndrome' review first published in 2002, and previously updated in 2007.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, MD; mean difference, SMD; standardized mean difference, 95% CI; 95% confidence interval.

Reference no.	24
Author (year)	Naumann (2014)
Title	Therapeutic benefit of balneotherapy and hydrotherapy in the management of fibromyalgia syndrome: a qualitative systematic review and meta-analysis of randomized controlled trials
Objectives	To assess the effectiveness of different forms of BT and HT in the management of fibromyalgia syndrome.
Eligibility criteria	The criteria were as follows: 1) types of study: RCTs were only eligible if they were published as full paper articles. No language restrictions were made; 2) types of participants: patients of any age diagnosed with fibromyalgia syndrome on recognized criteria were included; 3) types of intervention: studies that compared any kind of BT (mineral/thermal water, spa treatment, thalassotherapy, thermotherapy, peloids, natural therapeutic gas) or HT (treatment in plain water with or without exercise) with no treatment or any active treatment.
Information sources	MEDLINE via PubMed, Cochrane Library, EMBASE, and CMBASE.
Risk of bias	The Cochrane risk-of-bias tool was adopted. Only five studies included had low risk of bias and five studies had unclear risk. The remaining studies were at high risk of bias.
Included studies	24 studies met our inclusion criteria and were included in the qualitative analysis. Of these, 12 reported on HT and 12 on BT: 21 studies were suitable for quantitative analysis, 11 of which reported on HT and 10 on BT.
Synthesis of results	Meta-analysis showed moderate-to-strong evidence for a small reduction in pain (SMD -0.42, 95% CI -0.61 to -0.24) with regard to HT, and moderate-to-strong evidence for a small improvement in HR-QoL at the end of treatment (SMD -0.40, 95% CI -0.62 to -0.18). No effect was seen at the end of treatment for depressive symptoms and tender point count. BT in mineral/thermal water showed moderate evidence for a medium-to-large size reduction in pain and tender point count at the end of treatment (SMD -0.84, 95% CI -1.36 to -0.31) and (SMD -0.83, 95% CI -1.42 to -0.24). A significant effect on depressive symptoms was not found.
Description of the effect	For HT with exercise, the authors found moderate-to-strong evidence for a small improvement in pain and HR-QoL. Follow-up data provided moderate evidence for maintenance of improvement, at least with regard to pain. However, no evidence was found for improvement of depressive symptoms and tender point count. Furthermore, no group difference was found when comparing water-based exercise to land-based exercise.
Strengths and limitations of evidence	The primary aim of this systematic review and meta-analysis was to determine the therapeutic benefit of BT and HT in the management of fibromyalgia syndrome, with special focus on separate analyses of the different treatment modalities. The analyses were underpowered due to the small number of studies and patients included. The methodological quality (risk of bias) of the included studies varied, and was slightly better in HT studies than BT studies.
Interpretation	Based on the limited number of studies analyzed, small sample sizes and risk of bias attributed to the studies, it appears difficult to determine the overall benefit of BT and HT. There is a risk of overestimating the evidence on the efficacy of HT and even more so with BT. However, although evidence is limited, recommendations in recent evidence-based interdisciplinary guidelines emphasize a patient-tailored approach according to the key symptoms of fibromyalgia syndrome.
Funding	The article processing charge was funded by the German Research Foundation (DFG) and the Albert Ludwigs University Freiburg in the funding program Open Access Publishing.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, HT; hydrotherapy, HR-QoL; health related QoL, SMD; standardized mean difference, 95% CI; 95% confidence interval.

Reference no.	25
Author (year)	Lima (2013)
Title	The effectiveness of aquatic physical therapy in the treatment of fibromyalgia: a systematic review with meta-analysis
Objectives	To assess the effectiveness of aquatic physical therapy in the treatment of fibromyalgia.
Eligibility criteria	Only RCTs on the treatment of fibromyalgia with aquatic physical therapy which included patients who had been diagnosed according to the criteria of ACR were accepted. The outcome measures were those proposed by ACR: musculoskeletal pain, number of tender points, QoL, fatigue, sleep disturbances, morning stiffness, depression, anxiety, physical function, and rate of perceived exertion.
Information sources	MEDLINE via PubMed, EMBASE, CINAHL, LILACS, SCIELO, Web of Science, SCOPUS, SPORTDiscus, Cochrane Library, DARE, and PEDro.
Risk of bias	The Cochrane risk-of-bias tool was adopted. Eight studies presented a high risk of bias, 13 an unclear risk, and only six studies presented a low risk.
Included studies	Studies included in qualitative synthesis (n=27). Studies included in quantitative synthesis (n=15).
Synthesis of results	For the functional ability, three studies were considered with a treatment time of more than 20 weeks, MD -0.35 (95% CI -2.04 to -0.67) was found in favor of the aquatic physical therapy group versus no treatment. The same results were identified for stiffness and the 6-minute walk test where two studies were pooled with an MD of -1.58 (95% CI -2.58 to -0.58) and an MD 43.5meters (95% CI 3.8 to 83.2), respectively.
Description of the effect	Low to moderate quality evidence relative to control suggests that aquatic training is beneficial for improving wellness, symptoms, and fitness in adults with fibromyalgia.
Strengths and limitations of evidence	The effects of aquatic exercise training on fibromyalgia have been investigated in an increasing number of studies since the publication of our last review. In this review, the authors found the role of aquatic exercise training to be beneficial, particularly for fibromyalgia symptoms. They assumed the water allowed for ease of movement and therefore promoted better conditions for exercise. However, the evidence does not yet support a standard aquatic exercise program for individuals with fibromyalgia due to variability in the types of exercise and the wide ranges in intensity, duration, and frequency of exercise recommendations.
Interpretation	There are insufficient studies to allow adequate meta-analysis of the effects of aquatic exercise training compared to land-based interventions and other types of interventions. The evidence for reduction of pain warrants further work; this is the most common symptom complaint in this population. Long-term effects are poorly understood.
Funding	No funding.
Registration	This review is part of the update of the 'Exercise for treating fibromyalgia syndrome' review first published in 2002, and previously updated in 2007.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, QoL; quality of life, ACR; American College of Rheumatology, MD; mean difference, 95% CI; 95% confidence interval.



Reference no.	26
Author (year)	Liu (2013)
Title	The effect of mud therapy on pain relief in patients with knee osteoarthritis: a meta-analysis of randomized controlled trials
Objectives	To examine the effect of mud therapy on pain relief in patients with knee OA.
Eligibility criteria	Studies were considered eligible if they met the following criteria: (i) patients had a diagnosis of knee OA; (ii) comparison of mud therapy and usual care or placebo or blank was made; (iii) data regarding VAS pain or Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain were collected; (iv) study reported mean value and standard deviation or data required to calculate them; (v) sample size in each group had to be 10. Exclusion criteria were: (i) with experimental group containing other therapy; (ii) reviews; (iii) nonprospective comparative studies; (iv) data unavailable for meta-analysis.
Information sources	MEDLINE via PubMed
Risk of bias	The quality assessment was done using the Cochrane Collaboration Back Review Group's checklist. Clear description of the result was not noted on the text.
Included studies	Studies included in qualitative synthesis (n=7). Studies included in quantitative synthesis (n=7).
Synthesis of results	Patients with knee OA and who experienced mud therapy had significantly lower VAS scores (SMD 0.73, 95% CI 1.31 to 0.14) and WOMAC pain score (SMD -0.30, 95% CI -0.60 to 0.01) compared with the control group.
Description of the effect	For HT with exercise, the authors found moderate-to-strong evidence for a small improvement in pain and HR-QoL. Follow-up data provided moderate evidence for maintenance of improvement, at least with regard to pain. However, no evidence was found for improvement of depressive symptoms and tender point count. Furthermore, no group difference was found when comparing water-based exercise to land-based exercise.
Strengths and limitations of evidence	The primary aim of this systematic review and meta-analysis was to determine the therapeutic benefit of BT and HT in the management of fibromyalgia syndrome, with special focus on separate analyses of the different treatment modalities. The analyses were underpowered due to the small number of studies and patients included. The methodological quality (risk of bias) of the included studies varied, and was slightly better in HT studies than BT studies.
Interpretation	Based on the limited number of studies analyzed, small sample sizes and risk of bias attributed to the studies, it appears difficult to determine the overall benefit of BT and HT. There is a risk of overestimating the evidence on the efficacy of HT and even more so with BT. However, although evidence is limited, recommendations in recent evidence-based interdisciplinary guidelines emphasize a patient-tailored approach according to the key symptoms of fibromyalgia syndrome.
Funding	The article processing charge was funded by the German Research Foundation (DFG) and the Albert Ludwigs University Freiburg in the funding program Open Access Publishing.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, HT; hydrotherapy, OA; osteoarthritis, HR-QoL; health related QoL, VAS; visual analogue scale, SMD; standardized mean difference, 95% CI; 95% confidence interval.

Reference no.	3
Author (year)	Verhagen (2007)
Title	Balneotherapy for osteoarthritis
Objectives	To assess the effectiveness of balneotherapy for patients with OA.
Eligibility criteria	RCT comparing balneotherapy with any intervention or no intervention. At least 90% of the patient population had to be diagnosed with OA.
Information sources	EMBASE, MEDLINE via PubMed, Cochrane Library, and PEDro.
Risk of bias	Methodological quality is assessed by means of the "Delphi list" for quality assessment of RCTs. The quality assessment in this review appeared to be reliable. Based on the quality components 'concealed randomisation' and blinding the outcome assessor, no study appeared to be of high quality.
Included studies	Studies included in qualitative synthesis (n=7). Studies included in quantitative synthesis (n=7).
Synthesis of results	There were statistically significant differences in pain and function of Dead Sea + sulphur versus no treatment, only at end of treatment (MD 5.7, 95% CI 3.3 to 8.1), but not at 3 month follow-up (MD 2.6, 95% CI -1.1 to 6.3). There were no statistically significant differences in pain or function at one or three months of Dead Sea baths versus no treatment (MD 0.5, 95% CI -0.6 to 1.6) or at one or three months of sulphur baths versus no treatment (MD 0.4, 95% CI -0.9 to 1.7).
Description of the effect	Most studies presented positive findings, but the authors found silver level evidence concerning the beneficial effects of mineral baths compared to no treatment.
Strengths and limitations of evidence	Despite the popularity, reported scientific evidence for the effectiveness or efficacy of BT is sparse. This review evaluates the effects of BT in patients with OA. In most studies the scientific evidence is insufficient because of the poor methodological quality, the absence of an adequate statistical analysis, and for the patient, the absence of essential outcome measures (pain, QoL). Because of these methodological flaws a firm answer about the effectiveness of BT cannot be provided based on the included studies.
Interpretation	The authors found silver level evidence concerning the beneficial effects of mineral baths compared to no treatment. Of all other balneological treatments no clear effects were found. However, the scientific evidence is weak because of the poor methodological quality and the absence of an adequate statistical analysis and data presentation. Therefore, the noted "positive findings" should be viewed with caution.
Funding	No funding.
Registration	Not described.

Abbreviations;

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, OA; osteoarthritis, QoL; quality of life, MD; mean difference, 95% CI; 95% confidence interval.

Reference no.	27
Author (year)	Pittler (2006)
Title	Spa therapy and balneotherapy for treating low back pain: meta-analysis of randomized trials
Objectives	To assess the evidence for or against the effectiveness of ST and BT for treating LBP.
Eligibility criteria	All trials that reported that the sequence of allocation was RCTs testing BT or ST for treating patients with LBP were included.
Information sources	MEDLINE via PubMed, EMBASE, Cochrane Library, AMED, UK National Research Register, and ClinicalTrials.gov.
Risk of bias	The Jadad checklist was adopted. The methodological quality was on average adequate, given that patient blinding was not possible. In most trials the mineral content of the water was relatively low.
Included studies	Studies included in qualitative synthesis (n=5). Studies included in quantitative synthesis (n=5).
Synthesis of results	When comparing ST with control, there was a significant difference in terms of VAS (MD 26.6 mm, 95% CI 20.4 to 32.8). And when comparing BT with control, there was significant difference in terms of VAS (MD 18.8 mm, 95% CI 10.3 to 27.3).
Description of the effect	Even though the data are scarce, there is encouraging evidence suggesting that ST and BT may be effective for treating patients with LBP.
Strengths and limitations of evidence	The SR assessed all data from RCTs testing ST and BT for patients with LBP. There may be publication bias and location bias.
Interpretation	These data are not compelling but warrant rigorous large-scale trials.
Funding	Not described.
Registration	Not described.

**Abbreviations;**

SR; systematic review, RCT; randomized controlled trial, BT; balneotherapy, ST; spa therapy, LBP; low back pain, VAS; visual analogue scale, MD; mean difference, 95% CI; 95% confidence interval.

## References to studies excluded in this review

Authors. Journal (Year)	Title	Reason of exclusion
Dilekçi E, et al. Int J Biometeorol (2019)	Effect of balneotherapy on pain and fatigue in elderly with knee osteoarthritis receiving physical therapy: a randomized trial	RCT
Corvillo I, et al. Int J Biometeorol (2019)	Efficacy of aquatic therapy for neck pain: a systematic review	Not SR based on only RCTs
Depiazzi JE, et al. Clinical Rehabilitation (2019)	The effect of aquatic high-intensity interval training on aerobic performance, strength and body composition in a non-athletic population: systematic review and meta-analysis	Not SR for disease treatment
Antonelli M, et al. Complementary Therapies in Medicine (2019)	Hot sand baths (psammotherapy): a systematic review	Not SR based on only RCTs
Pinto C, et al. Am Academy Phys Med Rehabil (2019)	The effects of hydrotherapy on balance, functional mobility, motor status, and quality of life in patients with Parkinson's disease: a systematic review and meta-analysis	Not SR based on only RCTs
Yuan D, et al. Int J Biometeorol (2019)	Head-out in natural thermal mineral water for the management of hypertension: a review of randomized controlled trials	Not SR with meta-analysis
Antonelli M, et al. Int J Biometeorol (2018)	Effects of balneotherapy and spa therapy on levels of cortisol as a stress biomarker: a systematic review	Not SR based on only RCTs
Terrens AF, et al. Disability Rehabil (2018)	The efficacy and feasibility of aquatic physiotherapy for people with Parkinson's disease: a systematic review	Not SR based on only RCTs
Fraioli, et al. Bio Med Research Int (2018)	Efficacy of spa therapy, mud-pack therapy, balneotherapy, and mud-bath therapy in the management of knee osteoarthritis. a systematic review	Not SR with meta-analysis
Corvillo I, et al. Eur J Phys Rehabil Med (2017)	Efficacy of aquatic therapy for multiple sclerosis: a systematic review	Not SR based on only RCTs
Cruz SP. Eur J Phys Rehabil Med (2017)	Effectiveness of aquatic therapy for the control of pain and increased functionality in people with Parkinson's disease: a randomized clinical trial	RCT
Roostaei M, et al. Phys Occupational Ther Pediatrics (2017)	Effects of aquatic intervention on gross motor skills in children with cerebral palsy: a systematic review	Not SR based on only RCTs
Matsumoto H, et al. Clin Rheumatol (2017)	The effect of balneotherapy on pain relief, stiffness, and physical function in patients with osteoarthritis of the knee: a meta-analysis	Not SR based on only RCTs
Morer C, et al. Int J Biometeorol (2017)	The role of mineral elements and other chemical compounds used in balneology: data from double-blind randomized clinical trials	Not SR with meta-analysis
Forestier R, et al. Ann Phys Rehabil Med (2016)	Spa therapy and knee osteoarthritis: a systematic review	Not SR based on only RCTs
Santos I, et al. Int J Biometeorol (2016)	Balneotherapy in rheumatoid arthritis: a systematic review	Not SR with meta-analysis
Adsett J, et al. Int J Cardiol (2015)	Aquatic exercise training and stable heart failure: a systematic review and meta-analysis	Not SR based on only RCTs
Neto MG, et al. Int J Cardiol (2015)	Hydrotherapy on exercise capacity, muscle strength and quality of life in patients with heart failure: a meta-analysis	Other intervention
Bender T, et al. Int J Biometeorol (2014)	Evidence-based hydro- and balneotherapy in Hungary: a systematic review and meta-analysis	Restricted RCTs in Hungary
Fraioli A, et al. Ann Ist Super Sanità (2013)	Clinical researches on the efficacy of spa therapy in fibromyalgia: a systematic review	Not SR based on only RCTs
Verhagan AP, et al. Best Practice Research Clin Rheumatol (2012)	Aquatic exercise & balneotherapy in musculoskeletal conditions	Not SR
Falagas ME, et al. Int J Clin Pract (2009)	The therapeutic effect of balneotherapy: evaluation of the evidence from randomized controlled trials	Not SR based on only RCTs