Therapeutic aquatic exercises and immersion in rheumatologic disorders

BALNEOTHERAPY

R. Forestier, (Centre de Recherche rhumatologique et thermal, Aix-Les-Bains, France)
B Waller (University of Jyväskylä, Finland)
T Bender (Hospitaller Brothers of St John of God, Hungary)
J Lambeck (university of Loewen, Belgium)
Data sources

- Database: Medline + personal data
- Keywords: Balneotherapy, Mud, Hydrotherapy, Water
- Analysis of bibliography of retrieved articles
Study Selection

• Studies comparing the therapy spa or one of its components with any other treatment or no treatment

=> end of 2014
Collection & data analysis

- All studies were reviewed by the same reader.
- Analysis of data used a validated checklist for internal validity (10 items)
  - adequate randomization,
  - concealed allocation,
  - description of the interventions
  - Experienced therapists,
  - compliance of the participants,
  - Blinding of the participants (or similar lost to follow up rate
- blinded patients or similar concomitants treatments, withdrawal and lost to follow up rates
- therapist blinded or similar concomitants treatments, withdrawal and lost to follow up rates
- Investigator blinded; or measures to avoid bias: preferences, cluster, Zelen, standard binary judgment)
- Same schedule in the two groups
- Intention to treat analysis

CLEAR NTP, Boutron I, J Clin Epid 2005
Data Collection and analysis

• Personal Checklist for

❖ Quality of statistical Analysis (4 items):
  • Relevant statistical tests (normal distribution, group >30),
  • Control of false positives results by chance (main criteria, Bonferroni correction),
  • control of false negative by low statistical power
  • Intergroup comparison.

❖ External validity (3 items):
  • clear defined recruitment population,
  • number of patient in each step (screening, randomization, analysis),
  • clinically relevant improvement for patients (opinion of patient, MCII or PASS)
Data Collection and analysis

Quality of the side effect evaluation

- Side effect as a judgment criteria in the method section
- Clear evaluation of side effect in each group
- Accountability of side effect
- Severity of side effect

No analysis of publication bias (except for knee osteoarthritis)
BALNEOTHERAPY FOR OSTEOARTHRITIS (OA)
Methodological Quality in OA
publication bias overestimate the treatment effect

Median SRM = 0.52 < Mean 0.85

Heterogeneity for some trials
Quality of evidence in osteoarthritis

• 26 trials representing 1739 patients.
  - 3 (n=728) are of high internal validity (10→8/10) [Forestier 2010], [Franke 2013], [Fioravanti 2012]
  - 9 (n=421) are of middle validity (8→6/10) [Kovacs 2002], [Balint 2006], [Karagülle 2007], [Mahboob 2009] [Sherman 2009] [Fioravanti 2010] [Teffner 2012] but one did not make any group comparison [Obadasi 2002]
  - 13 (n=590) are of low validity [Nguyen 1997] [Cantariti 2007], [Evcik 2006], [Fraioli 2010], [Sherman 2009], [Sukenik 1999], [Szucs 1989], [Tishler 2004], [Wigler 1995], [Yurkturan 2006]
  - 1 was not available as a full text,
  - 10 studies did not make any group comparison
Osteoarthritis: multiple interventions combining mineral water and hydrotherapy techniques

- With low risk of bias spa therapy + home exercises are superior to home exercise alone at 3, 6 and 9 months and radon baths have a similar effect than bath in tap water.
- Bathing in mineral water appears to be more effective than no treatment (waiting list).
- With median risk of bias, spa therapy + home exercises is superior to no treatment (waiting list).

- these studies use a combination of traditional balneotherapy treatment associating mineral mud, bath in mineral water and sometimes underwater massages and water exercises in mineral water.
OA & mineral water

• With median risk of bias one study found that bathing in mineral water is more effective than bathing in tap water.

• The validity of other studies comparing bath in mineral water and bath in tap water is not sufficient to make any conclusion.
OA & mineral mud

• With median risk of bias there is conflicting evidence: one study found it more effective and the other found similar effect than usual care.

• With high risk of bias, mineral mud is more effective than depleted mud or covered mud.

• With high risk of bias there is no difference between mineral mud and hot pack [25].
<table>
<thead>
<tr>
<th>Type of side effect</th>
<th>Number of affected patients/sample size</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Itchy</td>
<td>1/32</td>
<td>Balint 2006</td>
</tr>
<tr>
<td>Colored skin &amp; nails</td>
<td>2/103</td>
<td>Franke 2013</td>
</tr>
<tr>
<td>Acute febrile condition</td>
<td>2/62</td>
<td>Balint 2006, Fioravanti 2012,</td>
</tr>
<tr>
<td>Upper respiratory tract infection</td>
<td>1/231</td>
<td>Forestier 2010</td>
</tr>
<tr>
<td>Erysipelas</td>
<td>1/231</td>
<td>Forestier 2010</td>
</tr>
<tr>
<td>Hypertension</td>
<td>3/135</td>
<td>Balint 2006, Franke 2013</td>
</tr>
<tr>
<td>Hypotension</td>
<td>1/30</td>
<td>Fioravanti 2012</td>
</tr>
<tr>
<td>Light side effect without</td>
<td>9/25</td>
<td>Cantariti 2007</td>
</tr>
<tr>
<td>interruption of spa treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>1/103</td>
<td>Franke 2013</td>
</tr>
</tbody>
</table>
## Side effect in OA

<table>
<thead>
<tr>
<th>Type of side effect</th>
<th>Number of affected patients/sample size</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painful knee episode</td>
<td>4/231</td>
<td>Forestier 2010</td>
</tr>
<tr>
<td>Low back pain</td>
<td>1/231</td>
<td>Forestier 2010</td>
</tr>
<tr>
<td>Aggravation of pain</td>
<td>1/103</td>
<td>Franke 2013</td>
</tr>
<tr>
<td>Venous insufficiency</td>
<td>1/231</td>
<td>Forestier 2010</td>
</tr>
<tr>
<td>Hematuria</td>
<td>1/231</td>
<td>Forestier 2010</td>
</tr>
<tr>
<td>Increase in diuresis</td>
<td>1/32</td>
<td>Balint 2006</td>
</tr>
<tr>
<td>No side effect</td>
<td>33</td>
<td>Wigler 1995</td>
</tr>
</tbody>
</table>
BALNEOTHERAPY FOR FIBROMYALGIA
Methodological Quality in fibromyalgia

- Side effect score: 4
- External validity: 3
- Statistical validity: 4
- Internal validity: 10

Chart showing the methodological quality of various studies on fibromyalgia.
Quality of evidence in Fibromyalgia

- In fibromyalgia we analyzed 14 trials (n = 742 patients)
  - 2 study realized in a spa center has a low risk of bias (but 1 has a low statistical power (n=30) [Donmez 2005] and the other did not perform any group comparison (Ozkurt 2010)
  - 4 studies have a median risk of bias (n=350) (de andrade 2008) [Zijlstra 2005 & 2007] (Altan 2004) (Evcik 2002) But only one performed group comparison with a sufficient statistical power
  - The others have a high risk of bias
Fibromyalgia

The best study

- Compare a treatment with mineral water or sea water with no treatment (waiting list with Zelen randomization)
- It shows a improvement of pain, fibromyalgia impact questionnaire, tender point count, opinion of patient & fatigue.
  - Bathing in mineral water in mineral water is superior to no treatment
  - Water exercise in sea water + education program + recreational activities + home exercises are superior to home exercises
Side effect in fibromyalgia

- Are reported in 4 of the balneotherapy studies
  - On report 2 transient erythema
  - One muscle pain in exercise group
  - One that no side effect were observed
  - One that no side effects were related to the treatment
BALNEOTHERAPY FOR BACK AND NECK PAIN
Methodological quality in back and neck pain

- Side effect score (4)
- External validity (3)
- Statistical validity (4)
- Internal validity (10)

Graph showing methodological quality scores for various studies.
Low back pain

- In low back pain evidence is based on 10 trial (n=1301 patients)
  - 2 have low and 2 have median risk of bias (n= 481) Constant 1995 Constant 1998 Kulisch 2009. & Teffner 2011
Balneotherapy in low back pain

• With low risk of bias a complex intervention associating bath, showers and mud improve more pain, quality of life, sometimes function and drug intake than usual care (waiting list) at 3 or 6 months,

• With median risk of bias comparison between mineral water and flat water remain inconclusive because of lack of statistical power,

• With high risk of bias an education program delivered during a spa treatment improve more fear, avoidance and patient agreement than single information
Chronic neck pain

- We found 2 trials (n=147 patients) [Forestier 2007] [Nechtvatal 2014]
  - With low risk of bias but lack of statistical power (lack of recruitment) pulsed electromagnetics fields are more effective than spa treatment
    - At the 6th month
    - For pain and function
    - But not for drug intake and quality of life,
    - With high risk of bias both treatments are superior to no treatment (lack of randomization, lost to follow up)
  - With high risk of bias balneotherapy is more effective than rehabilitation program
BALNEOTHERAPY FOR SPONDYLYARTHROPATHY (SA)
Validity in spondylarthropathy

Elkayam 2000
Van Tubergen 2001 2002
Codish 2005
Yurtkuran 2005
Altan 2006
Cozzi 2006
Colina 2009
Ciprian 2011

- Side effect score/4
- External validity/3
- Statistical validity/4
- Internal validity/10
Findings in spondylarthropathy

- We found 8 trials (n=425 patients)
  - 1 have a low risk of bias (n=120) [Van Tubergen 2001 & 2002],
  - 2 have median risk of bias (n=66) [Cozzi 2006] [Elkayam 2000]
  - 5 have high risk of bias (n=239) [Altan 2006], [Ciprian 2012], [Codish 2005], [Colina 2009].
Finding in spondylarthropathy

• In these studies, spa treatment is associated with home exercise and include water exercises.
• In ankylosing spondylitis (AS), improvement is significant until the 3rd month for a pooled score combining BASFI, pain, morning stiffness and patient assessment.
• In AS associated to chronic inflammatory disease, improvement of BASAI and BASFI is clinically relevant for patient [Cozzi 2006].
• In psoriatic arthritis, improvement in morning stiffness, tender joint count, number of swollen joint, neck or back pain is significant at 20 wks.
BALNEOTHERAPY FOR RHEUMATOID ARTHRITIS (RA)
Validity in Rheumatoid Arthritis

Elkayam 1991
Franke 2000
Franke 2007
Skeuz 2008
Sukenik 1990
Franke 2013

- Side effect score: 4
- External validity: 3
- Statistical validity: 4
- Internal validity: 10
Rheumatoid arthritis

- In RA we found 6 trials (n=410 patients), 3 with low risk of bias and 3 with high risk of bias, the best evidence is conflicting
  - One (n=60) [Franke 2000] shows a surprising worsening in the control group treated with active rehabilitation program in flat water (can partly explain the difference in favor of radon bath)
  - Another (n=98) [Franke 2013] it found no difference between radon bath and flat water
  - One (n=137) [Franke 2007] show a better improvement with radon + carbon dioxide bath compared with carbon dioxide bath without radon for quality of life but not for pain, function and drug intake
BALNEOTHERAPY FOR SHOULDER PAIN
Findings in shoulder pain

• In shoulder pain we found one trial (n=46)
• Effect of bath in mineral water + physiotherapy is superior to physiotherapy alone at 13th week
• With high validity and in spite of low statistical power this study shows a significant improvement of patient with shoulder pain for
  ✤ pain at rest,
  ✤ pain at movement,
  ✤ SPADI pain , and
  ✤ SPADI disability score.
Conclusion

- Balneotherapy improve patients with low back pain, osteoarthritis, fibromyalgia, shoulder pain, ankylosing spondylitis and RA.
- Adding water exercises & modern rehabilitation techniques to traditional balneotherapy may improve the efficacy of this treatment.