Investigating osteopathic spinal diagnosis and treatment in back pain patients with medical infrared thermography: A single blinded, randomized, and sham controlled pilot and feasibility study

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Background
Chronic and unspecified back pain has a high prevalence and disease burden worldwide (GBD 2019 Diseases and Injuries Collaborators, 2020). Osteopathic treatment seems to reduce pain and increase function in this population; however, the underlying mechanisms are largely unknown (Dal Farra et al., 2021). A putative mechanism of action might be the reduction of an inflammatory condition (D’Alessandro et al., 2016), which may lead to changes in temperature that are detectable using an infrared camera (Polidori et al., 2018). Hence, in this study, we investigated osteopathic spinal diagnosis and treatment in back pain patients using medical infrared thermography.

Methods
This single blinded, randomized, sham controlled pilot and feasibility study was carried out in Hamburg, Germany. Participants with chronic and nonspecific low and thoracic back pain were acquired and underwent pain assessment (using the numeric rating scale; NRS), infrared imaging (using medical infrared thermography; MIT), osteopathic spine diagnosis (using tenderness, asymmetry, restricted motion, and tissue texture changes; TART), and spinal or sham manipulation (1:1 allocation). First, we assessed if the protocol is feasible and infrared imaging could support the osteopathic approach to back pain management. Second, we evaluated whether the spinal segments (Th1-L5) reported as painful (NRS showed correlated palpatory findings [TART] and changes in temperature [MIT]) at baseline (diagnosis) and if these parameters changed after one week following the application of single spinal or sham manipulation (treatment). While the therapeutic effect was assessed independently for each parameter between baseline (T0), post-treatment (T1) and follow-up (T2), the diagnostic correlation required two or three parameters to be present in one spinal segment of one participant at T0 and/or T2. For each parameter to be rated, pain needed to exceed one on the NRS, somatic dysfunction required at least one positive TART criterion, and temperature had to be significantly higher or lower compared to the mean body temperature measured using MIT.

Results
We assessed 56 participant for eligibility, randomized 19 participants, and lost two to follow-up (n=17) (Figure 1). The sample was primarily female (70%), young (35 ± 9.4) and showed persistent pain (6 ± 4.6 years) (Table 1). Overall, the protocol seems feasible for future studies, pending modifications of the eligibility criteria, recruitment process, and sample size calculation. No conclusive statement could be drawn regarding the feasibility of an infrared camera to support osteopathic back pain management. In detail, the diagnostic correlation was low with 6.3% and 4.3% of spinal segments showing simultaneous signs of pain (NRS), somatic dysfunction (TART), and aberrant temperature (MIT) at baseline and follow-up, respectively. Spinal segments showing overlap of two parameters were correlations between TART and MIT (44% and 53%), NRS and TART (31% and 2%), and NRS and MIT (25%, 19% and 19%) at baseline and follow-up, respectively (Figure 2). After treatment, no significant changes were reported in the number of palpatory findings (TART). However, pain intensity (NRS) and temperature (MIT) significantly changed in the spinal manipulation group (NRS: p=<0.001 and MIT: p=0.029) but not the sham manipulation group (NRS: p=0.301 and MIT: p=0.194) (Figure 3.4). Notably, minor and short-term musculoskeletal side effects were reported in one participant.

Table 1: Demographic and Clinical Data (n=17)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>SD</th>
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<tr>
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<tr>
<td>Pressure points</td>
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<td>26.3</td>
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<tr>
<td>Stimulation area</td>
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</tbody>
</table>

Conclusion
Taken together, osteopathic spine diagnosis does not seem to identify spinal segments that are linked to pain perception or aberrant temperature. However, if spinal manipulation is applied to those segments, significant reduction in pain and modification in temperature ensues.

Literature

Osteopathy Research within
OsteopathieSchule Deutschland

Online Conference 2021
Osteopathy meets Psychology
November 18th - 20th
osteopathy-conference.com

Figure 1: Consort Participant Flow

Figure 2: Overlap of two parameters

Figure 3: NRS (mean values from T0 to T2)

Figure 4: Temperature from T0 to T1 to T2

Figure 5: Example of the changes in temperature from T0 to T2

Figure 6: Example of the changes in temperature from T0 to T2