EFFECTS OF SUPERVISED ACTIVE WHOLE BODY ELECTROMYO-STIMULATION TRAINING IN PEOPLE WITH CHRONIC NONSPECIFIC LOW BACK PAIN ON PAIN AND FUNCTION.

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PUBLIC PHD DEFENCE FOR THE DEGREE OF
DOCTOR IN REHABILITATION SCIENCES AND PHYSIOTHERAPY

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AUDITORIUM 5, VUB CAMPUS JETTE

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ABSTRACT OF THE RESEARCH

Background: Chronic nonspecific low back pain (cNSLBP) represents a leading cause of disability globally, frequently exacerbated by kinesiophobia, which impedes effective rehabilitation. Whole-body electromyostimulation (WB-EMS) has emerged as a time-efficient and joint-preserving intervention to address these challenges, though its efficacy and optimal application remain understudied.

Objective: This dissertation evaluates the effectiveness of low-frequency WB-EMS in managing cNSLBP through three interrelated studies, focusing on its impact on pain and function, comparative performance against multimodal treatments, and the influence of baseline pain intensity on treatment outcomes.

Methods: Given the absence of WB-EMS studies for back pain on PubMed and Pedro databases at the project's inception in early 2017, the investigation commenced with a prospective clinical intervention (Study 1) comparing low-frequency WB-EMS to a multimodal treatment concept in cNSLBP patients. This was followed by a retrospective analysis (Study 2) examining the impact of baseline pain intensity on WB-EMS outcomes. Subsequently, with the publication of additional WB-EMS trials, the investigation concluded with a systematic review and meta-analysis (Study 3) synthesizing the available evidence to assess WB-EMS's overall efficacy, comparative performance, and clinical utility [29]. Pain intensity (Numeric Rating Scale, NRS) and functional outcomes (e.g., Oswestry Disability Index, ODI; trunk strength) served as primary measures, with methodological quality evaluated using the PEDro Scale.

Results: Study 1 demonstrated that WB-EMS significantly reduced pain (NRS) and improved function (ODI) over 24 weeks. At 6 weeks, NRS decreased by 1.38 points (from 4.45 to 3.07), at 12 weeks by 1.58 points (to 2.87), and at 24 weeks by 2.04 points (to 2.40); ODI improved by 16.08 points (from 33.8 to 17.72) at 6 weeks, 15.8 points (to 18.01) at 12 weeks, and 19.7 points (to 14.10) at 24 weeks, outperforming the multimodal ACG in pain outcomes. Study 2 revealed a moderate correlation (rs = 0.551, $p < 0.001$) between baseline pain intensity and pain reduction, with the greatest improvements (3.72 points) in patients with NRS > 7. Study 3 confirmed robust within-group improvements (pooled pain reduction: -0.87 NRS, 95% CI [-1.02, -0.72], I^2 = 70%; function: SMD 0.84, 95% CI [0.68, 0.99], I^2 = 76%), strong effects against PCG (0.75 pain, 0.85 function), and competitive performance against ACG (0.33 pain, 0.28 function, I^2 > 90%). Adverse events were minimal (mild muscle soreness in 1-5 participants).

Conclusion: This dissertation suggests that low-frequency WB-EMS may serve as a potentially effective and time-efficient complementary therapeutic option for managing cNSLBP, alongside existing treatments such as multimodal approaches, indicating that it may reduce pain and improve function, particularly for patients with high baseline pain or mobility limitations. Given the methodological limitations of the studies, these findings advocate for cautious consideration of WB-EMS's integration into clinical guidelines as a supplementary option, especially for patients constrained by time or joint-related limitations. Future research should focus on larger, randomized trials, extended follow-ups, and personalized applications to better understand its role in rehabilitation sciences.

CURRICULUM VITAE

- Since 2018 Lecturer in Physiotherapy (Döpfer, Munich DE)
- Since 2017 PhD Candidate in Rehabilitation Sciences and Physiotherapy (VUB),
- Since 2016 Visiting Researcher (LMU, Munich DE)
- 2013 Master of Science in Physical Therapy Science (Thim van der Laan, Landquart CH);
- 2010 Bachelor of Science in Physiotherapy, (PHPN, Kreuzlingen CH)
- Since 10/2004 Self-employed Physical Therapy, Naturopathy
- 2004 Medical Masseur and Hydrotherapist