Trunk Muscle Activity during Dynamic Exercises on Land and in Water for Participants with and without Chronic Low Back Pain

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Background

The literature (Waller 2009, Barker et al 2014):

• No negative effects of exercising in water

• Substantial variations of exercise programmes

• No specific classifications of LBP

• No evidence that control interventions were more or less effective
Aim

- Establish muscle activity during water exercises similar to research on land
- Compare healthy and CLBP
- Provide detailed exercise descriptions
Methods

• 20 healthy:20 CLBP males (18-44yrs, BMI<28)

• Waterproof wireless EMG

• Mean and peak muscle activity: ES, MF, Glut max and med, RA, EO, IO/TA

• VAS, RPE, HR

• 20 exercises land and water
1. Upper limb and trunk movements
2. Lower limb movements
3. Proprioception exercises

Ex1L  Ex2  Ex3L  Ex4  Ex5

Ex1L  Ex2  Ex3L  Ex4  Ex5
4. Other exercises
Mean muscle activity

No statistical significance between healthy and CLBP participants in all exercises
No statistical significance between water and land environments upper limb movements
Mean muscle activity

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Mean Muscle Activity

Ex1L

Mean Muscle Activity (%)

ESL  ESR  ML  MR  GMaxL GMaxR GMedL GMedR RAL  RAR  OEL  OER  OIL  OIR

land LBP  land healthy  water LBP  water healthy
Mean Muscle Activity

GMedL  GMedR

land LBP
land healthy
water LBP
water healthy
Rate of Perceived Exertion (RPE)

- No significant difference between LBP and control group
- Significant differences between water and land

### Highest RPE (Borg scale)

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<th>Upper Limb Exercises</th>
<th>Lower Limb Exercises</th>
<th>Proprioception Exercises</th>
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</tbody>
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Heart Rate

• No significant difference between LBP and control group
• Heart rate higher on land compared to water for all exercises

Pain

• No significant difference between LBP and control group
• No significant differences between water and land
  
  Fewer reports of pain during exercise in water
  X15 water
  X42 land
Conclusions

• Exercise providers can use these exercises to inform their rehab programmes. Water can be used as an effective environment for recruiting trunk/hip muscles similar to land, and modified accordingly.
  • Cadence and Equipment

• Water may even be a more suitable environment for acute sudden onset LBP or for those with higher levels of chronicity, fear avoidance and inability to exercise on land.
  • Less pain experienced in the water
  • More support in the water if balance is affected
Conclusions

• NICE guidelines for LBP specify “take peoples specific needs, preferences and capabilities into account when choosing type of exercise”
  • Choose the environment for rehabilitation most suited to your patients needs
Acknowledgements

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