SPATIAL DISTRIBUTION AND ACTIVITY OF THE ERECTOR SPINAE MUSCLES IN CYCLISTS WITH RECENT HISTORY OF LOW-BACK PAIN

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INTRODUCTION

Low back pain (LBP) accounts for **~58%** of all musculoskeletal disorders in cycling[1]. Erector spinae (ES) muscles have been previously identified as one of the potential major causes[2]. Foregoing evidence on rowers with LBP reported an **altered magnitude** and **spatial distribution** of ES activity[3]. Conversely, less is known about cyclists' lumbar region activation patterns.

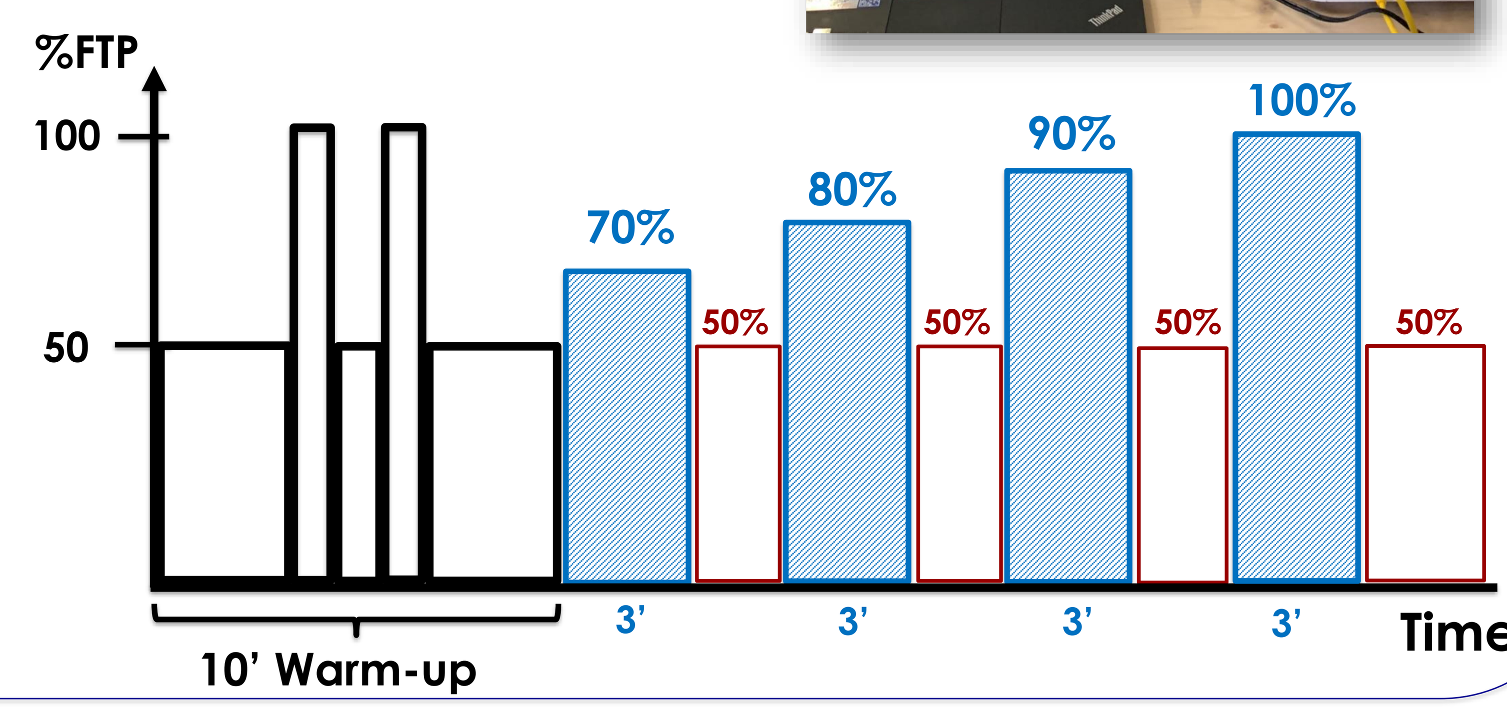
AIM

The aim of this **cross-sectional study** was to compare the activation and spatial distribution of ES muscles in cyclists with and without a recent history of LBP.

METHODS

Based on **Oswestry Disability Index** (ODI-I), participants were assigned to either an LBP or to an asymptomatic (CON) group. They performed an incremental cycling test. Concurrently, the ES activity was recorded bilaterally through High-Density surface EMG **HDsEMG** (EMG-Quattrocento, OT Bioelettronica, Turin). The average normalized root-mean-square amplitude **(RMS)**, the **entropy**, and the **y-axis barycentre (y-bar)** of the RMS maps were extracted and compared between sides, loads, and groups. An **electro goniometer** was used to define the right and left pedal strokes.

	LBP	CON
	N=10	N=11
Age (y)	42.9 ± 11.5	37.2 ± 12.5
Height (m)	1.8 ± 0.1	1.7 ± 0.1
BMI (Kg·m-2)	23.1 ± 2.4	22.4 ± 1.3
ODI-I (%)	18.5 ± 10.1	0



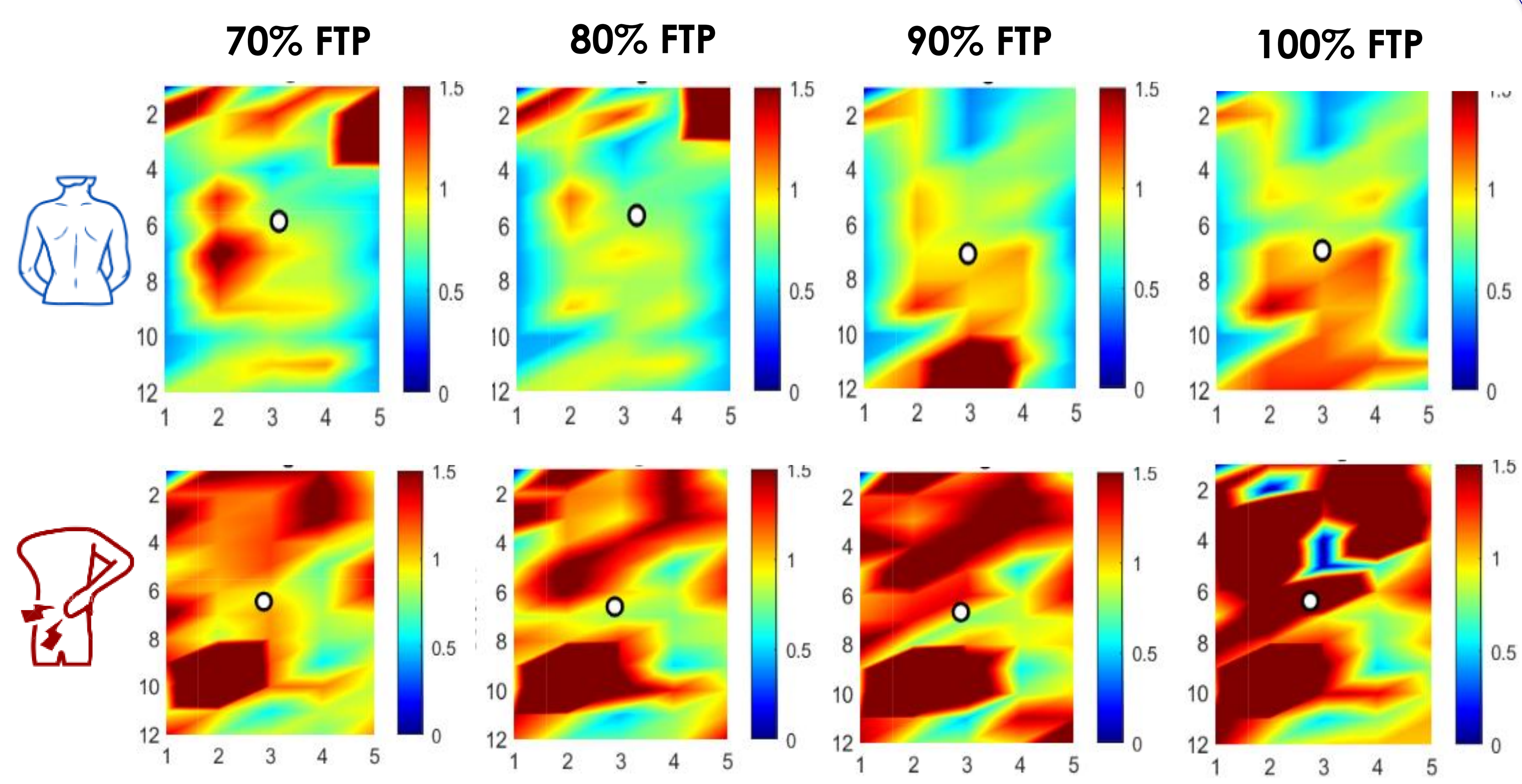
RESULTS

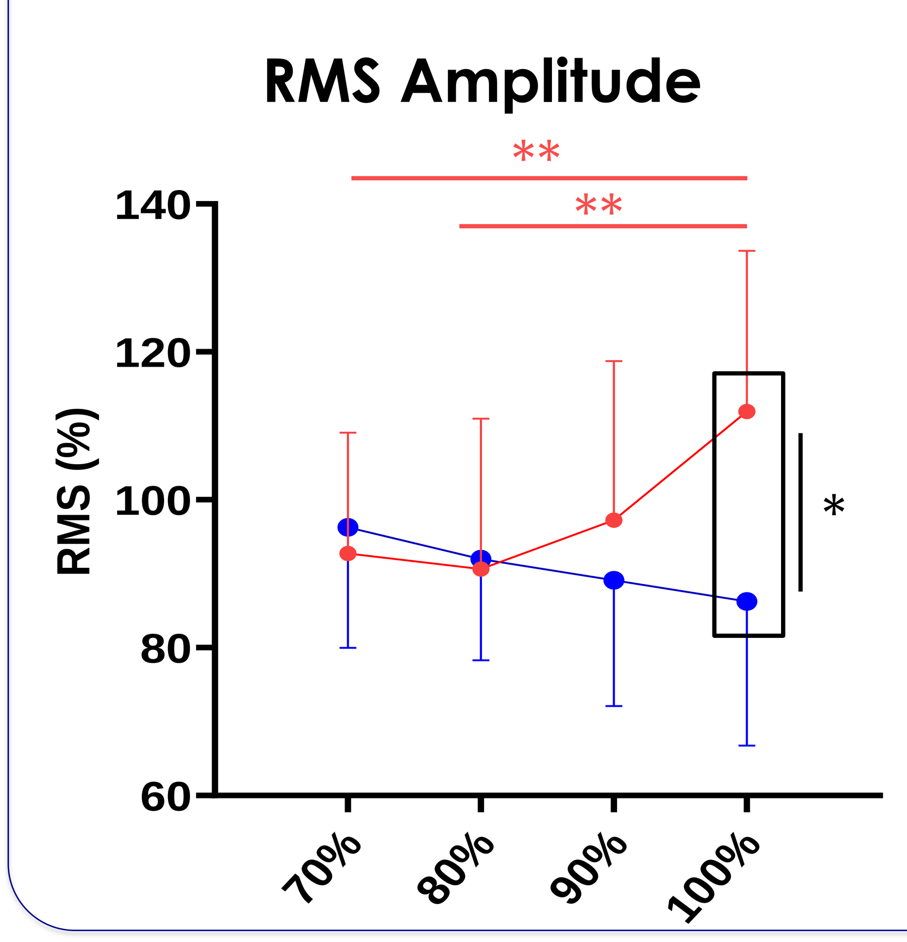
No within-group differences were observed between sides, therefore extracted EMG variables were averaged between sides.

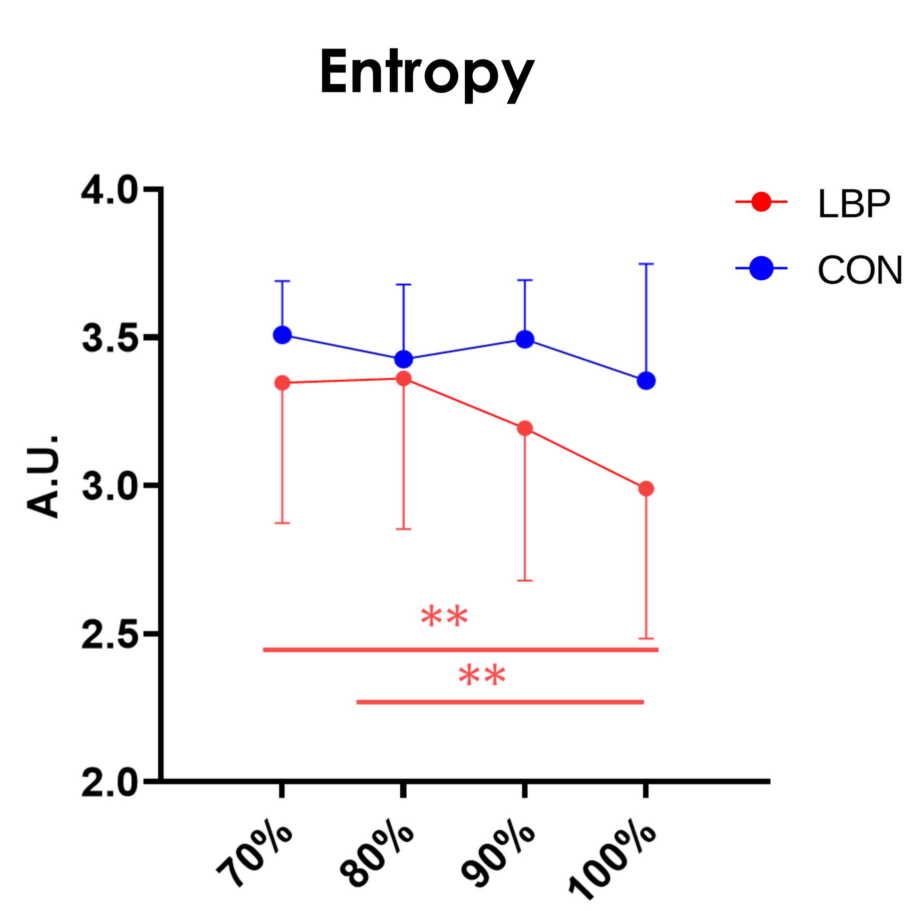
A **load x group interaction** was observed for RMS amplitude (2-way ANOVA, p=.003) and entropy (p=.038).

Post hoc analyses revealed **differences** in **RMS amplitude** between 70-100% (+ ~19%, p=.010), 80-100% FTP (+ ~21%, p=.004) in the LBP, and between LBP and CON (~9.6%, p=.049) at 100% FTP.

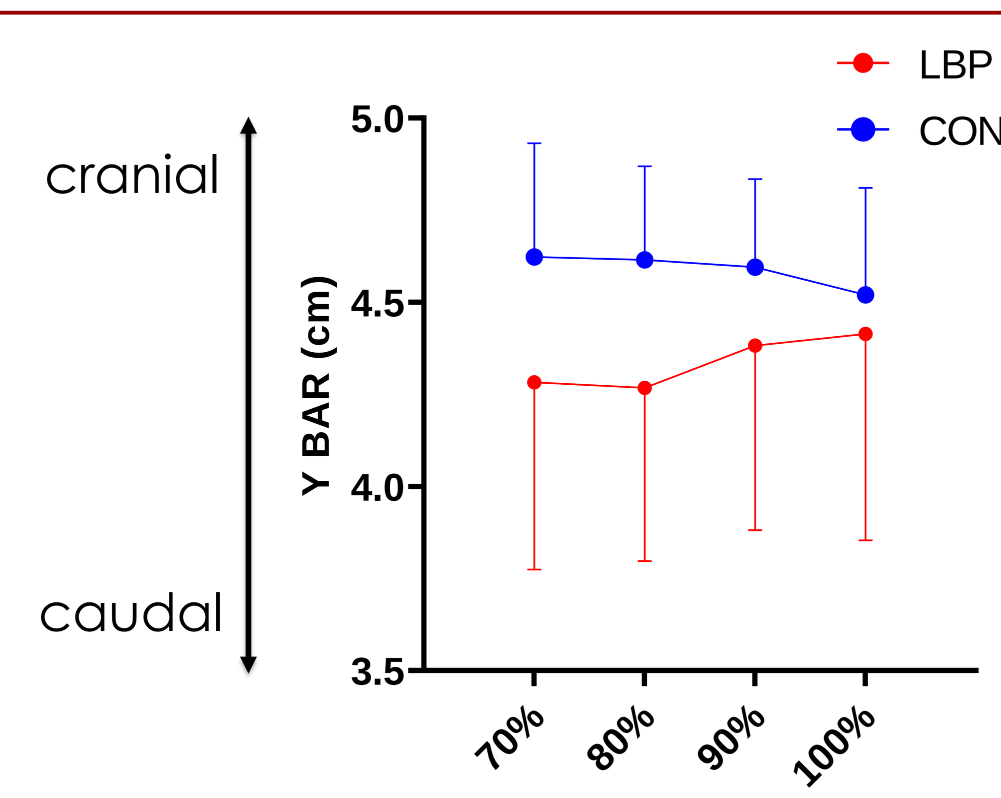
Similarly, **entropy differed significantly** between 70-100% FTP (- ~8.4%, p=.002) and 80-100% FTP (- ~8.5 %, p=.002) in the LBP.







A **load x group** interaction (p=.033) was observed for the **y-bar** of RMS maps. However, post hoc analyses did not reveal any difference between loads or groups.



DISCUSSION AND CONCLUSIONS

As the load increased, LBP cyclists showed **greater and less homogeneous ES muscles activation** compared to CON. The increase in ES activation may be the result of an augmented motor unit recruitment and/or increased discharge rate (i.e., neural drive). The decrease in entropy suggests a **more heterogeneous** ES activation at higher %FTP intensities. In contrast, previous studies reported that more homogeneous activation of various muscle regions may be essential in preventing musculoskeletal injuries[4,5,6]. Our findings suggest that the greater magnitude and reduced homogeneity of ES muscles activation may reflect an **inefficient recruitment strategy** in cyclists with a recent history of LBP.

REFERENCES

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