MENTAL CHRONOMETRY IN PATIENTS WITH CHRONIC LOW BACK PAIN AND A HEALTHY CONTROL GROUP

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Introduction

Mental chronometry (MC) records the time taken up by imagined movements as compared to actual movements (Jensen 2006). While there is evidence from a number of studies that healthy subjects exhibit similar response times under both conditions (Guillot et al., 2005), current research provides no indication as to whether this also applies to chronic low-back pain (CLBP).

Purpose

The goal of our study therefore was to investigate whether MC differs between patients with CLBP and a healthy control group. The assumption is that MC in patients with CLBP differs from that of a healthy control group.

Participants

The study recruited 8 patients with CLBP (aged 43.3 ± 10.3, 1.70 ± 9.27 m, 24.3 ± 3.1 kg/m^2) and 9 healthy patients without CLBP (aged 31.3 ± 8.9, 1.74 ± 13.6 m, 23.6 ± 3.4 kg/m2). The pain intensity (VAS) in the patients with CLBP was 5.9 ± 1.3, and pain duration in weeks was 281 ± 248.

Methods

MC was performed using a battery of movements which were presented in a random order. The battery of movements involved forward and backward flexion of the lumbar spine, the sock test in sitting and standing position, moving from a supine position to a seated position, and squats in standing position. A stopwatch was used to time imagined and actual movements. Nonparametric statistical methods (Friedmann test and Mann-Whitney U test) were employed to measure mean score differences within or between groups. The significance level was set at p<.05

Results

In the patients with CLBP, the mean duration of imagined movements was significantly lower compared to the mean duration of the actual movements (Table 1). There were no differences in the control group, with the exception of forward flexion in the sitting position.
The mean duration of imagined movements of the patients with CLBP was significantly lower compared to the controls except for the squat movement (Table 2).

Table 1. Differences in actual vs. imagined movements times (CLBP Group)

Movement	Actual movement time (s)	Imagined movement time (s)	p-value
Forward flexion in standing	4.2 ± 0.8	7.0 ± 2.0	.01
Forward flexion in sitting	3.6 ± 0.7	6.9 ± 2.1	.01
Backward flexion in standing	4.2 ± 1.4	5.8 ± 1.9	.03
Backward flexion in sitting	4.2 ± 0.1	6.0 ± 2.5	.01
Supine to sitting position	5.0 ± 0.8	8.4 ± 2.6	.00
Sock test in sitting position	2.7 ± 0.6	6.0 ± 3.2	.03
Sock test in standing position	3.5 ± 0.9	6.9 ± 2.7	.00
Squat in standing position	3.2 ± 0.5	6.6 ± 2.5	.03

Table 2. Differences in imagined movements times in CLBP vs. Controls.

Movement	Imagined movement time (s)		p-value
	CLBP	Controls	
Forward flexion in standing	7.0 ± 2.0	3.5 ± 1,7	.00
Forward flexion in sitting	6.9 ± 2.1	2.9 ± 0.8	.00
Backward flexion in standing	5.8 ± 1.9	3.1 ± 1.2	.00
Backward flexion in sitting	6.0 ± 2.5	2.9 ± 0.8	.00
Supine to sitting position	8.4 ± 2.6	4.3 ± 2.4	.01
Sock test in sitting position	6.0 ± 3.2	3.0 ± 1.1	.02
Sock test in standing position	6.9 ± 2.7	3.7 ± 1.2	.00
Squat in standing position	3.2 ± 0.5	6.6 ± 2.5	.03

Discussion & Conclusions

Patients with CLBP exhibit significant differences in MC. We showed that patient with CLBP exhibit no similar response times under both conditions. Furthermore, the response time for imagined movements in CLPB patients are significant higher in comparison against patients without CLBP.
These may be caused by neurophysiological changes in the central nervous system and a disturbed body representation which developed with CLBP (Flor et al., 1997., Bray et al., 2011).

Recommendations

Further work is needed to investigate the relationship of an improved MC and also the influence on pain and motor control outcomes.

Acknowledgements

All procedures received ethical approval from the Ethics committee of the University of Wuppertal.

References

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