



The twitch response in spinal muscles with spinal manipulation: is it clinically relevant?

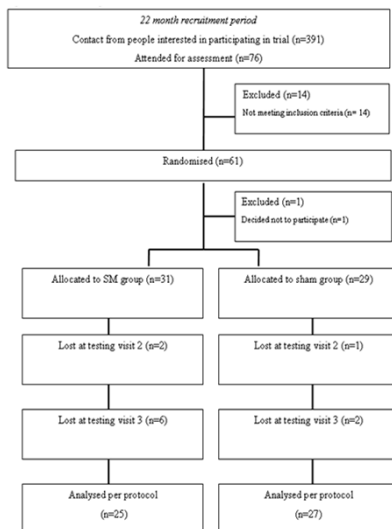
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PURPOSE

Reflexic twitch responses to SMT have been proposed to contribute to hypoalgesia (reduction in perception of pain) however this mechanism is not fully established. This work examined the clinical relevance of reflexogenic responses in the spinal muscles by comparing the magnitude of twitch responses with change in pain and by comparing responses during a SMT technique and sham SMT procedure.

CONSORT DIAGRAM

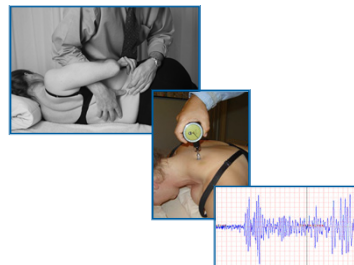


METHODS

This was a single-blind randomised controlled trial. 60 patients were randomised to receive a single high velocity low amplitude thrust or a sham manipulation of the lumbar spine. The SMT was targeted towards the level that was considered dysfunctional. The reflexic response to the SMT, in a number of muscle groups, was examined using surface electromyography (sEMG). Local and distant pressure pain threshold (PPT) algometry and visual analogue scales of pain (VAS) were also used. The intervention was repeated on three separate occasions over three weeks. The study was approved by an Ethical Committee.

ANALYSIS

Between group comparisons were made using analysis of variance models. Strengths of association between sEMG and clinical outcomes were examined using Pearson's Correlation coefficients with 95% Confidence Intervals.



RESULTS

1) There were greater increases in the PPT of the multifidus in the SMT group compared to the sham group after each application of SMT. Locally not distantly

Differences in pain outcomes: sham and SMT group

Change in		Adjusted mean difference	Significance (p)	95% CI
		Right	1.47 kg/cm ²	0.00
PPT Multifidus	Left	0.97 kg/cm ²	0.01	0.24 to 1.71
	Right	-0.44 kg/cm ²	0.13	-1.01 to 0.14
PPT Trapezius	Left	-0.10 kg/cm ²	0.79	-0.87 to 0.67

Table of the parameter estimates, from the repeated measure ANOVA, showing the adjusted mean difference (B), significance and the 95% confidence intervals for immediate changes in pain measures for the differences between the spinal manipulation and sham group, at test 1.

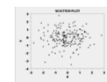
2) There were statistically larger sEMG responses in the multifidus of the SMT group, compared to sham. Not for the first two applications of SMT and not distantly.

Longitudinal differences in the magnitude of the reflex responses

EMG reflex		F	sig
		Right	9.57
Multifidus	Left	5.01	0.03
	Right	3.53	0.07
Trapezius	Left	2.25	0.14

Table showing the repeated measure ANOVA for the sEMG time x arm interaction. F value and the significance (sig), for the SMT and sham groups.

3) There was no correlation between the size of sEMG response and baseline pain or disability levels. In addition, there was no correlation between the size of sEMG responses and change in PPT or VAS pain



CONCLUSIONS

•SMT specifically causes greater reduction in pain and a greater local sEMG response in the multifidus muscle than at distal muscles. Presumably this is due to the direct stretch on these segmental muscles.

•Differences in sEMG, between sham movement and targeted SMT, are detected after repeated applications of SMT and are not obvious on the first application of SMT whilst pain changes are immediately apparent

•Magnitude of sEMG response did not correlate with baseline pain or changes in pain or disability.

Thus, we conclude that the widespread muscular reflexic twitch that accompanies SMT is a transient phenomenon, occurring in response to fast spinal movement, which is relatively unimportant in the mechanisms of hypoalgesia.

IMPLICATIONS

Popular theories that SMT may "reboot the system" by stimulating a reflex and resetting muscle tone are unlikely to be accurate