Journal of Chiropractic Medicine (2014) 13, 230–238

ELSEVIER

JCM Journal of Chiropractic Medicine

www.journalchiromed.com

Effect of Lumbar Spine Manipulation on Asymptomatic Cyclist Sprint Performance and Hip Flexibility

Eric Olson BS [a], Michael Bodziony BS [a], John Ward DC, MA, MS [b,*], Jesse Coats DC, DAAPM [c], Bradley Koby DC [d], Doug Goehry BS [a]

[a] *Graduate Student, Texas Chiropractic College, Pasadena, TX*
[b] *Associate Professor/Research Fellow, Department of Physiology and Chemistry, Texas Chiropractic College, Pasadena, TX*
[c] *Professor, Department of Clinical Specialties, Texas Chiropractic College, Pasadena, TX*
[d] *Assistant Professor, Chair, Department of Principles and Practices, Department of Diagnosis, Texas Chiropractic College, Pasadena, TX*

Received 11 June 2014; received in revised form 21 August 2014; accepted 23 August 2014

Key indexing terms:
Exertion;
Physical;
Rate;
Heart;
Exercise;
Manipulation;
Spinal;
Acupuncture;
Chiropractic

Abstract

Objective: The purpose of this study was to measure the impact of midlumbar spinal manipulation on asymptomatic cyclist sprint performance and hip flexibility.

Methods: Twelve cyclists were equally randomized into an AB:BA crossover study design after baseline testing. Six participants were in the AB group, and 6 were in the BA group. The study involved 1 week of rest in between each of the 3 tested conditions: baseline testing (no intervention prior to testing), condition A (bilateral midlumbar spine manipulation prior to testing), and condition B (sham acupuncture prior to testing, as a control). Testing was blinded and involved a sit-and-reach test followed by a 0.5-km cycle ergometer sprint test against 4-kp resistance. Outcome measures were sit-and-reach distance, time to complete 0.5 km, maximum heart rate, and rating of perceived exertion. An additional 8 cyclists were recruited and used as a second set of controls that engaged in 3 testing sessions without any intervention to track test acclimation. An analysis of variance was used to compare dependent variables under each of the 3 conditions for the experimental group and control group #1, and a repeated-measures analysis of variance was used to analyze test acclimation in control group #2.

Results: Lumbar spine manipulation did not demonstrate statistically significant between-group changes in sit-and-reach (P = .765), 0.5-km sprint performance time (P = .877), maximum exercise heart rate (P = .944), or rating of perceived exertion (P = .875).

Conclusions: The findings of this preliminary study showed that midlumbar spinal manipulation did not improve hip flexibility or cyclist power output of asymptomatic participants compared with an acupuncture sham and no-treatment control groups.

* Corresponding author. Texas Chiropractic College, 5912 Spencer Hwy, Pasadena, TX 77505. Tel.: +1 281 998 5704.
E-mail address: jward@txchiro.edu (J. Ward).

http://dx.doi.org/10.1016/j.jcm.2014.09.004
1556-3707/

Introduction

Spinal manipulation and acupuncture are 2 forms of alternative medicine classified as mind and body practices.[1] The impact spinal manipulation and acupuncture have on exercise performance has been minimally studied, particularly among asymptomatic athletes. This is concerning considering that these 2 modalities are often used by athletes.[2–8]

There is limited research on how spinal manipulation may impact athletic performance.[9–22] Among asymptomatic participants, spinal manipulation has not been shown to acutely improve run time to exhaustion, maximum oxygen consumption, rating of perceived exertion (RPE), blood lactate, exercise heart rate, free throw accuracy, or 30-m sprint time.[9–12] Spinal manipulation, however, has been shown to increase hip mobility among runners,[9] how far golfers can drive a ball,[14] and handgrip strength of judo athletes.[20] The mechanism by which spinal manipulation has impacted athletic performance in some research studies is unclear, but it may involve alterations in paraspinal muscle reflexes and motorneuron excitability[23] leading to increased force output.[24] As a result, to gain better clarity on how manipulation could impact athletes, studies should focus on different topical attributes of exercise performance (eg, anaerobic power, aerobic performance, plyometrics, agility) to demonstrate clear trends. This study differs from the work of other researchers in this field in that it focuses on anaerobic power of athletes.

In addition, there is a paucity of research demonstrating that acupuncture may have some role in enhancing exercise performance.[25–27] Acupuncture has preliminarily been shown to improve quadriceps maximum isometric voluntary force in athletes, but not drop jump height.[28] The exact mechanism by which acupuncture could impact exercise performance is unclear and needs further analysis with methodologically strong studies.[2]

Cyclists rely on power to help them climb hills and accelerate past other racers. Wingate-like tests are popular short-duration, all-out cycling sprint tests against high resistance that measure power.[29–33] Typically, these sprint tests last 30 seconds[29]; but there are modified versions that last longer.[34,35] In general, anaerobic capacity tests, like Wingate tests, should be very physically challenging and completed by participants in 30 to 90 seconds.[36–39] Supramaximal tests like these rely heavily on both the creatine phosphate system and glycolysis to provide energy.[40,41]

The purpose of this study was to determine if midlumbar spine manipulation could positively impact asymptomatic cyclist sprint performance and hip flexibility.

Methods

This study was reviewed and approved by the Texas Chiropractic College Institutional Review Board for human subjects in accordance with the Declaration of Helsinki. All subjects were provided a written and oral explanation of the study procedures prior to participation. This trial was registered with the University Hospital Medical Information Network Clinical Trials Registry, trial no. UMIN000014899.

Study Design and Setting

This was a blinded, randomized, controlled study of the impact that lumbar spine manipulation had on cycle ergometer sprint performance and hip flexibility. Twenty cyclists were involved in this study and underwent testing once per week over a 3-week period (Fig 1). Participants were tested under 3 possible conditions: baseline condition (no intervention prior to testing), condition A (bilateral lumbar spine manipulation prior to testing), and condition B (sham acupuncture to arbitrary points). During each test iteration, participants performed a sit-and-reach test 15 minutes postintervention (if they were scheduled for an intervention that week) followed by a 0.5-km cycle ergometer sprint against 4-kp resistance. This study used an AB:BA crossover design[42] to reduce exercise test acclimation as a covariate between the 2 compared main conditions, A vs B.

Participants, Randomization, and Blinding

Twenty-eight asymptomatic cyclists were recruited via word of mouth for this study (Fig 2). All study applicants provided an informed written consent on college-approved documents. They were then screened against inclusion and exclusion criteria. Two participants were dropped from the study. One male participant dropped out of the study after his baseline test session because of scheduling conflicts. One female participant was dropped from the study because her baseline cycle ergometer test took longer than 100 seconds, demonstrating that she was not fit enough for the study. Their data are not included in any analysis. Twenty participants (Table 1) completed the study.