

The spinal manipulation/chiropractic care neurophysiological function and immune markers.

Imran Amjad ^{1,2}

Copyright © 2023 The Author(s). Published by Foundation University Journal of Rehabilitation Sciences.

The spinal manipulation and chiropractic care can significantly influence central neural function. The prefrontal cortex activity changed after spinal manipulation/chiropractic care, like improved error of joint position sense, (1) cortical processing, (2, 3) reflex excitability, (4) reaction time, (2) cortical sensorimotor integration, (3, 5) motor control, (5) and strength of lower extremity muscle. (6) The prefrontal cortex is a fundamental region of the brain responsible for multimodal integration. It is the part of the brain responsible for executive functions, (7) i.e., the process by which the different regions of the brain integrate and coordinate the processes of various neural systems to solve cognitive and motor problems and achieve tasks based on the frequently fluctuating environment. (8) It has a vital part in pain perception, (9) emotional control & mental health, (10) and it contributes in regulating the autonomic nervous system, the immune and the endocrine system. (11) The Prefrontal cortex is supposed to be the main region of the brain for assisting various neural systems integration, control and coordination. It requires development a sequence of subtasks to achieve a final task, concentrating attention on applicable information, inhibiting unrelated distractors, switching attention among tasks, observing memory, initiating movement, and responding to stimuli. (8)

A recently published review (12) has summarized basic science evidence that spinal manipulation /chiropractic care modulate immune mediators. (13) However, most of these studies assessed the immune markers instantaneously before and after spinal manipulations/adjustments or a few hours post-adjustment on the same day. (13) As the Prefrontal

cortical activity also mediates the regulation of the hypothalamic-pituitary-axis, the autonomic nervous system, and the immune system. Interaction of Neuro-immune is affected by pain and emotional-related stress. Stress triggers the sympathetic nervous system and also the hypothalamic-pituitary-axis and ultimately induces inflammation in the body. Moreover, Stress inhibits the prefrontal cortical activity, sequentially it decreases its inhibitory control on the hypothalamic-pituitary-axis and inhibits the anti-inflammatory parasympathetic nervous system action. This stress-induced inflammation declines the immune response. Spinal manipulation/Chiropractic adjustments have been shown to affect the mechanism of vertebral motor control, the activity of the prefrontal cortex and the concentrations of immune markers in the human body.

References:

1. Haavik H, Murphy B. Subclinical Neck Pain and the Effects of Cervical Manipulation on Elbow Joint Position Sense. *Journal of Manipulative and Physiological Therapeutics*. 2011;34(2):88-97.
2. Kelly DD, Murphy BA, Backhouse DP. Use of a mental rotation reaction-time paradigm to measure the effects of upper cervical adjustments on cortical processing: a pilot study. *Journal of manipulative and physiological therapeutics*. 2000;23(4):246-51.
3. Haavik-Taylor H, Murphy B. Cervical spine manipulation alters sensorimotor integration: A somatosensory evoked potential study. *Clinical Neurophysiology*. 2007;118(2):391-402.
4. Herzog W, Scheele D, Conway PJ. Electromyographic responses of back and limb muscles associated with spinal manipulative therapy. *Spine*. 1999;24(2):146-52.
5. Taylor HH, Murphy B. Altered Sensorimotor Integration With Cervical Spine Manipulation. *Journal of Manipulative and Physiological Therapeutics*. 2008;31(2):115-26.
6. Hillermann B, Gomes AN, Korporaal C, Jackson D. A pilot study comparing the effects of spinal

Affiliation: ¹Riphah International University, Islamabad, Pakistan; ²Centre for Chiropractic Research, New Zealand College of Chiropractic, Auckland, New Zealand

Correspondence: Imran Amjad

Email: imran.amjad@riphah.edu.pk

DOI: <http://doi.org/10.33897/fujrs.v3i1.325>

How to Cite: Amjad I. The spinal manipulation/chiropractic care neurophysiological function and immune markers. *Foundation University Journal of Rehabilitation Sciences*. 2023 Jan;3(1):1-2

-
- manipulative therapy with those of extra-spinal manipulative therapy on quadriceps muscle strength. *Journal of manipulative and physiological therapeutics*. 2006;29(2):145-9.
7. Lelic D, Niazi IK, Holt K, Jochumsen M, Dremstrup K, Yelder P, et al. Manipulation of Dysfunctional Spinal Joints Affects Sensorimotor Integration in the Prefrontal Cortex: A Brain Source Localization Study. *Neural Plast*. 2016;2016: 3704964.
 8. Funahashi S, Andreau JM. Prefrontal cortex and neural mechanisms of executive function. *Journal of Physiology-Paris*. 2013;107(6):471-82.
 9. Lorenz J, Minoshima S, Casey KL. Keeping pain out of mind: the role of the dorsolateral prefrontal cortex in pain modulation. *Brain*. 2003;126(Pt 5):1079-91.
 10. Arnsten AFT, Raskind MA, Taylor FB, Connor DF. Blair. *Neurobiology of Stress*. 2015;1:89-99.
 11. Machado S, Cunha M, Velasques B, Minc D, Teixeira S, Domingues CA, et al. Sensorimotor integration: basic concepts, abnormalities related to movement disorders and sensorimotor training-induced cortical reorganization. *Rev Neurol*. 2010;51(7):427-36.
 12. Haavik H, Niazi IK, Kumari N, Amjad I, Duehr J, Holt K. The Potential Mechanisms of High-Velocity, Low-Amplitude, Controlled Vertebral Thrusts on Neuroimmune Function: A Narrative Review. *Medicina*. 2021;57(6):536.
 13. Plaza-Manzano G, Molina F, Lomas-Vega R, Martínez-Amat A, Achalandabaso A, Hita-Contreras F. Changes in biochemical markers of pain perception and stress response after spinal manipulation. *Journal of orthopaedic & sports physical therapy*. 2014;44(4):231-9.
-

Copyright Policy

All Articles are made available under a Creative Commons "Attribution-NonCommercial 4.0 International" license. Copyrights on any open access article published by FUJRS are retained by the author(s). FUJRS is an open-access journal that allows free access to its published articles, in addition, to copy and use for research and academic purposes; provided the article is correctly cited. FUJRS does not allow commercial use of the articles published in FUJRS. All articles published represent the view of the authors and do not reflect the official policy of FUJRS.