

Stressbusters: Investigating the Effects of OMT on Stress Management



01. Introduction

Medical students report high levels of stress and burnout. The combination of physical stressors such as poor posture while studying, impaired quality of sleep, and mental stress from the rigorous curriculum stimulates the sympathetic nervous system to secrete cortisol, the stress hormone. Prior studies have shown that persistent elevated cortisol levels are associated with adverse physical and mental health outcomes.

Osteopathic Manipulative Medicine (OMM) employs various manual techniques to modulate the autonomic nervous system, aiming to restore a balance between the sympathetic and parasympathetic branches. Through targeted manipulations such as myofascial release, cranial techniques, and others, OMM can potentially alleviate stress, reduce muscle tension, and enhance blood circulation.

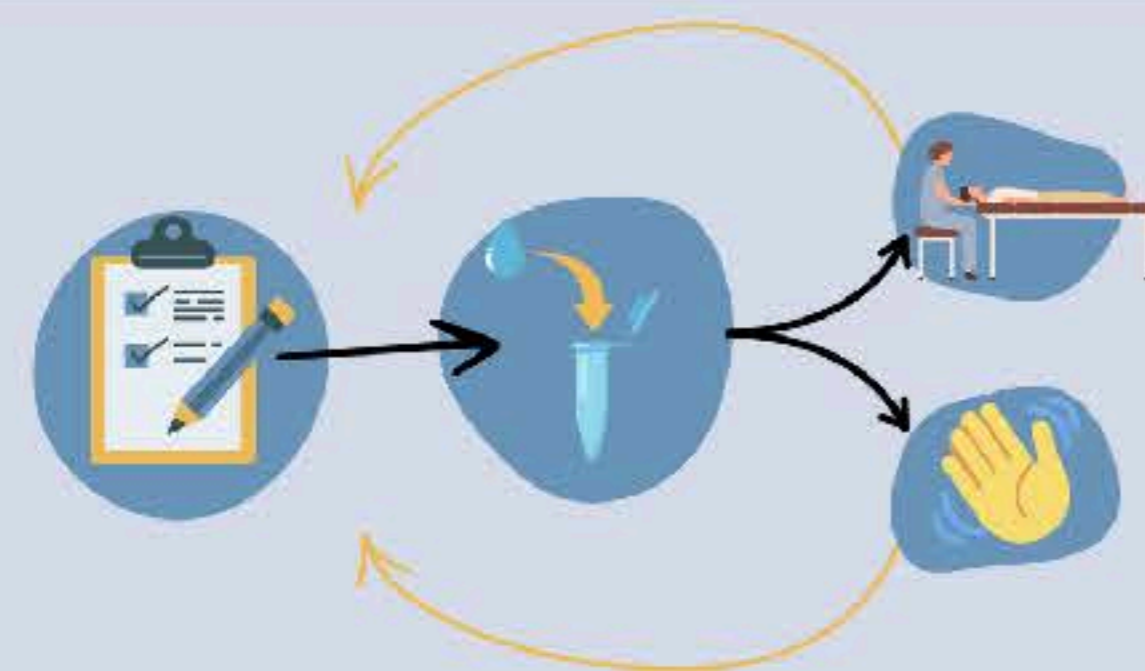
02. Objective

Our goal was to determine if regular weekly sessions of targeted OMT could help medical students mitigate their stress levels during preclinical years and reduce the rate at which systemic cortisol levels increase throughout a medical school semester, possibly improving both short and long term health outcomes. We additionally tried to determine if weekly cortisol levels changes were linked to changes in cognitive function.



03. Methodology

Participant salivary samples were collected on a weekly basis for 6 weeks and stored in a (- 4°C) refrigerator. These samples were analyzed using an Invitrogen ELISA Immunoassay Kit. 100 uL of each sample was diluted in 200 uL of Assay Buffer. Standard cortisol concentration showed an inversely proportional exponential relationship to optical density at 450 nm as seen in Table 1



- Participants reported to assigned private rooms at designated times at TouroCOM-Harlem campus
- Completed CSSS Survey
- Provided saliva samples for cortisol assay
- For 5 weeks, participants returned to assigned private rooms at designated times
- Treatment group received paraspinal inhibition, rib raising, and condylar decompression
- Control group did not receive any treatment
- All participants completed CSSS Survey and provided saliva samples

Table 1 – Cortisol Optical Density at 450nm

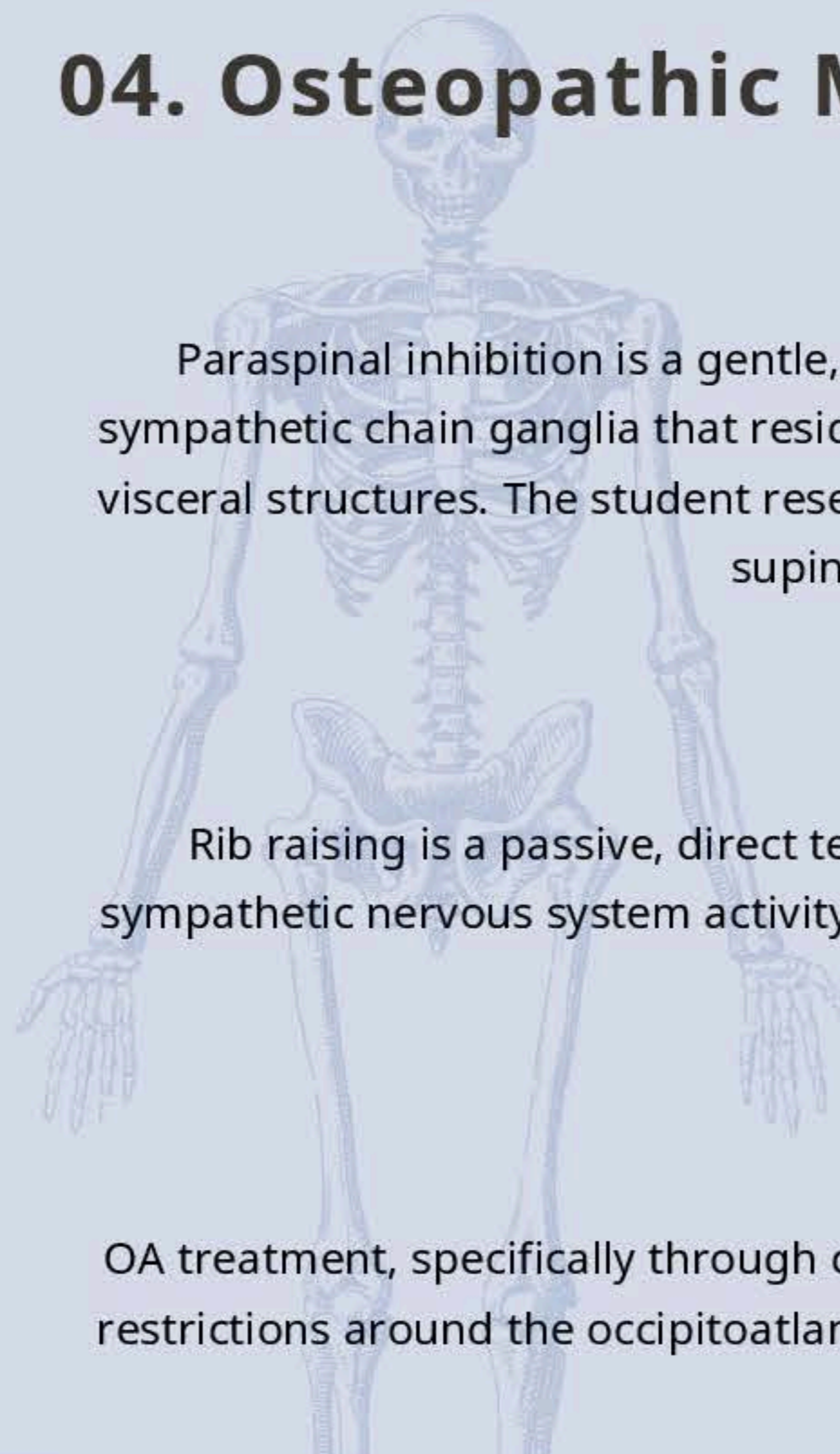
Standard Cortisol pg./mL	Optical Density
3200	0.131
1600	0.2
800	0.286
400	0.387
200	0.457
100	0.517

The line of best fit for standard cortisol concentration (y axis) against optical density at 450 nm (x axis) was calculated to be $y = 9667.93 \cdot 10^{-6}x$ with a r^2 of .99.

References

1. Feldt, Ronald. (2008). Development of a Brief Measure of College Stress: The College Student Stress Scale. Psychological reports. 102, 855-60. 10.2466/PRO.102.3.855-860.
2. Schoorlemmer, R. M., Peeters, G. M., Van Schoor, N. M., & Lips, P. (2009). Relationships between cortisol level, mortality and chronic diseases in older persons. Clinical Endocrinology, 71(6), 779-786. <https://doi.org/10.1111/j.1365-2265.2009.03552.x>

04. Osteopathic Manipulative Treatment



Paraspinal Inhibition

Paraspinal inhibition is a gentle, passive technique targeting the fascia surrounding the spine. It targets the sympathetic chain ganglia that reside in the paraspinal region to reduce sympathetic output, thereby softening the visceral structures. The student researcher contacted the area while applying lateral traction with the participant in supine position until a change in muscle tone was felt.

Rib Raising

Rib raising is a passive, direct technique used to address restricted excursion of the rib cage and modulate sympathetic nervous system activity. The technique consists of a gentle pull of the ribs away from their articulation with the spine.

Condylar Decompression

OA treatment, specifically through condylar decompression, is a passive, direct cranial technique used to free local restrictions around the occipitoatlantal joint. This technique is used to normalize parasympathetic tone to decrease cortisol levels.



05. Analysis

The study assessed the weekly change in optical density (ΔOD) measured at 450 nm for both the treatment and control groups. The sample size for each group was $n = 5$. The treatment group exhibited a mean ΔOD of 0.0215 with a standard deviation (SD) of 0.0243, while the control group exhibited a mean ΔOD of -0.0044 with an SD of .0061. The average ΔOD of the treatment and control groups, along with the average ΔOD of each participant is shown in Table 2.

Under the assumption of a normal distribution of data, we conducted an unpaired, two-tailed t-test to compare the average ΔOD between the treatment and control groups. The t-test yielded a t-value of 2.309 with 8 degrees of freedom (df), resulting in a p-value of $p = 0.0497$, which is statistically significant at the $p < 0.05$ level. This change in ΔOD between the two groups is visualized in Figure 2. An additional effect size analysis supported our finding of a significant decrease in weekly cortisol levels in the treatment group, Cohen's $d = 1.460$

Based on the College Student Stress Scale (CSSS) responses, there was no significant difference in perceived stress between the control and treatment groups ($p = 0.8655$, two-tailed). The mean weekly change in stress scores was -1.084 for the treatment group and -1.212 for the control group, with a negligible effect size (R squared = 0.003809). The CSSS score change for both groups is visualized in Figure 1.

Table 2 – Average weekly ΔOD of each participant

Group	Participant ΔOD					Avg ΔOD
Treatment	0.05465	0.0062167	-0.00477	0.01327	0.038	0.02147334
Control	-0.0096	0.0052	-0.00515	-0.00297	-0.009483	-0.0044

Figure 1 - Average weekly change in CSSS score

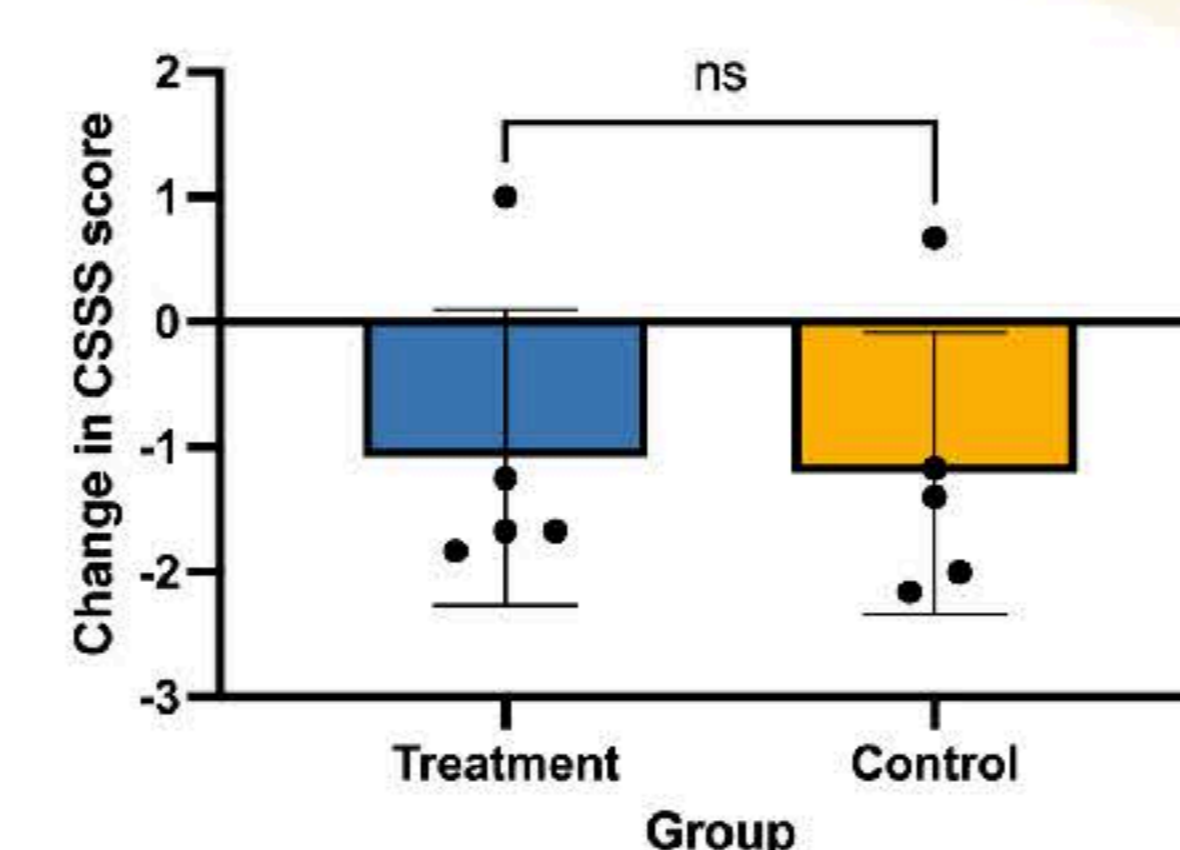
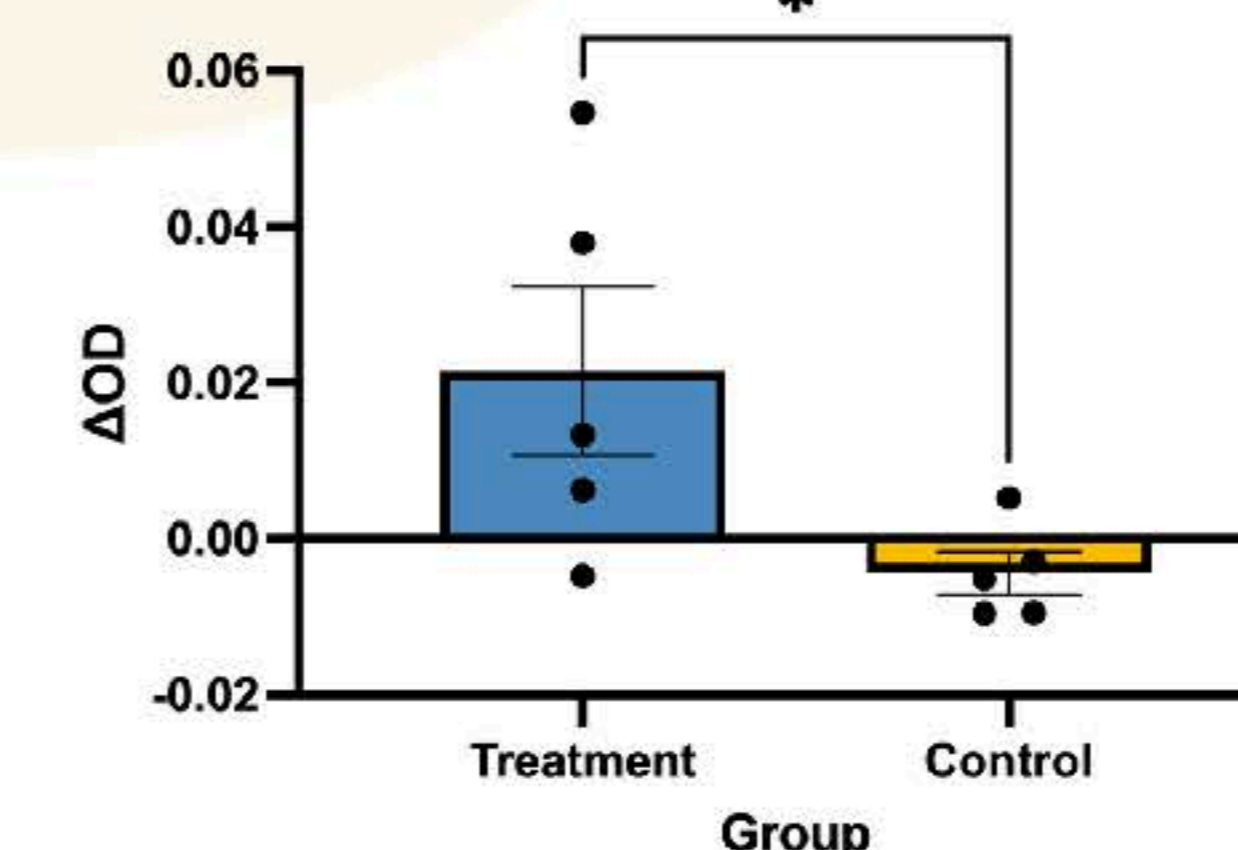


Figure 2 - Avg Weekly ΔOD Changes



06. Conclusion and Future Considerations

1. Regular osteopathic manipulative treatment (OMT) is shown to significantly reduce increases in cortisol levels. Figure 2 shows a statistically significant increase in ΔOD in the treatment group while there was a decrease in ΔOD in the control group. The inverse relationship between cortisol concentration and ΔOD indicates a significant decrease in cortisol amongst the treatment group.
2. Despite the physiological evidence from cortisol levels suggesting reduced stress through OMT, there wasn't a statistically significant pattern observed in the self-reported stress perception scores measured using the CSSS survey between the two groups.
3. High levels of cortisol have been linked to chronic diseases, and future studies can look at the use of OMT on patients with diseases such as Diabetes Mellitus or Hypertension and determining if treatment can lower their cortisol levels and, by extension, improve their health outcomes.²

