Scholar: Pilot and Validation Studies ISSN: 2689-7644
Volume 3 Issue 2 Pages: 13 – 16 DOI:10.32778/SPVS.71366.2022.31

The relationship between osteopathic manipulative treatment and focused breath work: A pilot study

Authors: Ryan Blevins, OMS IV, Bethany Doles, OMS III, Justin Buck, OMS III, Suzanne Blevins, OMS III, Marybeth Babos, PharmD, Courtney Taylor, OMS IV, Omari Baines-Waiz, OMS IV, Stephen Bergman, DO

Affiliations:

1) Lincoln Memorial University-DeBusk College of Osteopathic Medicine, Harrogate, TN

Keywords: Osteopathic manipulative treatment, Osteopathic manipulative medicine

Abstract:

Introduction:

According to osteopathic principles, structure and function of the human body directly influence one another. 'Somatic dysfunction' is known as altered or impaired function of related components of the somatic system; skeletal, arthrodial, myofascial, vascular, neural, and lymphatic. Osteopathic Manipulative Treatment (OMT) is the manual procedure utilized to treat somatic dysfunction. Focused breath work increases patient's awareness of their breath. Altered breathing patterns are part of the constellation of somatic dysfunction within a patient. This study is designed to consider the effect of the sample size on the statistical significance for further study investigation while comparing the impact of OMT and focused breath work on somatic dysfunction.

Methods:

This crossover trial included 35 participants from a pool of healthcare professional students. Participants were assigned to one of three groups. All groups were assessed for somatic dysfunction (SD), Thoracoabdominal Range of Motion (TROM), and Peak Expiratory Flow (PF) in each session. Each group followed a separate protocol for two weeks: either generalized osteopathic treatment (GOT), breathing exercise (BE) to be completed three times per week, or both. All participants completed each protocol over a six-week period.

Results:

Statistical significance was observed in the group that received both OMT (GOT) and BE revealing an estimated effect size for the intervention.

Conclusion:

Based on these results, we can recommend that breathing exercises combined with OMT may reliably decrease the incidence of somatic dysfunction.

Article History: Date received: 09/27/2022 Date revised: 12/17/2022 Date accepted: 12/21/2022
Corresponding Author: Ryan Blevins **E-mail:** ryan.blevins03@lmunet.edu

Introduction:

The osteopathic tenets include recognizing the inherent relationship between the structures of the body and the functions of the body. The two are reciprocally interrelated on a fundamental level and significantly influence the homeostatic capacity of the body.

The structure of the lungs, thoracic cage, vertebrae, thoraco-abdominal diaphragm, pelvic diaphragm, and all the surrounding muscles produces the function of respiration and circulation.[1] Osteopathic manipulative treatment (OMT) has been shown to improve the functionality of breathing.[2] Additionally, breathing exercises (BE) have been implemented in improving the functionality of the respiratory system, including those with respiratory disease such as COPD (Chronic Obstructive Pulmonary Disease).[3] However, more research is needed to examine a possible synergistic relationship between OMT and breathing exercises. This adjunct to typical medical treatment for a range of pathology could potentially impact patient outcomes and quality of life.

This pilot study is designed to investigate the combination of OMT and BE, and whether there is a statistically significant improvement in somatic dysfunction, thoraco-abdominal range of motion

Volume 3 Issue 2 Pages: 13 – 16 DOI:10.32778/SPVS.71366.2022.31

(TROM), and peak expiratory flow (PF) compared to OMT or BE alone.

Methods:

Subject Selection. The subjects represented students from colleges of healthcare professionals including the Doctor of Osteopathic Medicine (DO) and Physician Assistant (PA) programs. There were sixty-three viable subjects who met the inclusion criteria which included commitment through the entire study, non-pregnant, no history of osteoporosis, no fractures, no acute inflammatory disease, no blood disorders, no cancers, no acute or symptomatic respiratory illness such as pneumonia, and no current adjustments to any medications. Subjects consented to the parameters of the study via a Qualtrics survey. Lack of consent prevented them from continuing with the survey. The final subject pool was reduced to a total of forty due to the logistics of data collection and administering OMT. The final forty subjects were then randomly assigned to one of three groups (A, B, or C). There was an attrition of 5 subjects before the end of the study leaving a final cohort of 35 subjects (Table 1). Research Design. This study was designed as a 3-way crossover study. The authors were interested in learning the effect size needed to gain significant results in future prospective studies. The crossover groups included BE, OMT, and both.

Table 1: Demographics

Gender (n)	Age Ranges (n)
Female (28)	23-30 (31)
Male (7)	30 to 36 (4)

Age ranges are for both genders and in years.

Baseline data was collected for all subjects at the initial meeting. Data collected included the Thoracoabdominal Range of Motion (TROM), Peak Expiratory Flow (PF), and Somatic Dysfunction Scale (SDS). Data collection was repeated every 2 weeks over a 6-week period. Each group switched roles every 2 weeks. There was a total of four data collection sets for each subject.

The OMT utilized in the OMT and 'both' groups was a general osteopathic treatment (GOT) which is a treatment intending to reduce the most significant SD within the body as a preventative health measure.[4] The OMT protocol was to treat each of the areas of great dysfunction directly associated with primary and secondary respiratory muscles, as well as anatomic diaphragms. The SD within each subject was assessed in a uniform manner by each of three examiners using a 40-point scale that would provide a single numeric representation of somatic dysfunction burden for the individual subject. The 40-point scale used was determined by consensus of the examiners and termed the Somatic Dysfunction Scale (SDS). Clinical osteopathic medicine recognized 10 regions of the body as a standard. For each body region, a 5-point scale (0-4) was used to grade the severity of somatic dysfunction burden within that region, with a possible total of 40 points. The criteria for differentiating between a severity level of 0, 1, 2, 3, or 4 was pre-determined by the three examiners prior to the beginning of data collection. SDS was assessed for all groups, including those not receiving OMT. When OMT was performed, it was done within a 15-to-20-minute timeframe for whole-body treatment to mimic the average time generally utilized in a healthcare setting for this procedure. The primary techniques utilized included myofascial release, muscle energy, balanced ligamentous tension (ligamentous articular strain), functional positional release, and Still technique. The technique used was determined by the response of the restriction as perceived by the practitioner.

The BE were taught to subjects via verbal instruction, demonstration, video instruction, and a written document to ensure consistent training and reference in the home environment. Subjects were briefly tested by examiners to ensure adequate understanding of the exercises. There were 9 exercises designed to recruit the abdominal wall, pelvic floor, and the thoraco-abdominal diaphragm.[5] The BE were performed 3 days per week at home for the 2-week interval. Thoraco-abdominal range of motion (TROM) was calculated by measuring the circumference, in inches, of the thoracic cage at the level of the inferior costal margin in the midclavicular line during inhalation and exhalation. A score was calculated with the following equation: (Inhalation-Exhalation)/Exhalation X 1000 = TROM.[5] Subjects were also provided with individual peak flow meters to measure Peak Expiratory Flow (PF) as a measure of volume and contractile force.

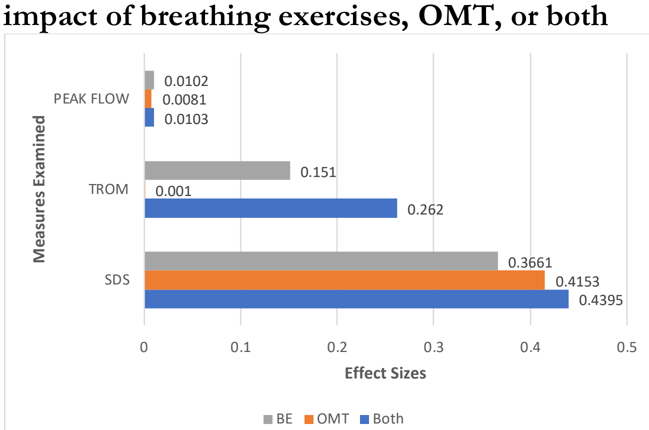
 ISSN: 2689-7644
Volume 3 Issue 2 Pages: 13 – 16 DOI:10.32778/SPVS.71366.2022.31

The data collected was submitted to secure, anonymous Qualtrics profiles. Data analysis was performed using SPSS analytic software (IBM, Arowonk NY). ANCOVA was applied to examine differences in outcomes related to treatment order. Outcomes for each group protocol (BE alone, OMT alone, and BE/OMT combined) were compared to baseline for Peak Flow (PF), Thoraco-abdominal Range of Motion (TROM), and Somatic Dysfunction Scale (SDS). For normally distributed continuous data, ANOVA and paired T-test compared results to the subjects' baseline. For continuous data that was not normally distributed and for ordinal data, Friedman's test and Wilcoxon signed-rank tests were used. In each case, Bonferroni correction for multiple measures was applied to the p-values. Effect size was calculated for continuous data by dividing t statistic by standard deviation,[6] and for comparisons generated via Wilcoxon test, by dividing Z score by square root of N.[7]

Results:

Collecting different forms of data required different statistical approaches to derive accurate effect sizes (ES) for each category. The absolute value of the calculated ES for each intervention is shown in the graph in Figure 1.

Figure 1: Effect sizes needed to investigate the impact of breathing exercises, OMT, or both



BE: Breathing exercises, OMT: Osteopathic manipulative treatments, SDS: Somatic Dysfunction Scale, TROM: Thoraco-abdominal Range of Motion

Prior to calculating the ES for each measurement, the ANCOVA test was used to determine if the order in which subjects participated in each group had any effect on the data results. The p values were PF p = 0.093, TROM p = 0.429, and SDS p = 0.097. This allowed us to examine the groups individually. Wilcoxon was used for determining the ES for somatic dysfunctions (SDS) and thoraco-abdominal range of motion (TROM). The TROM data was not of normal distribution; hence a Friedman test was also needed. Peak Flow (PF) could be accurately discovered as a Cohens D. The largest ES was seen in the OMT and BE combined group for all three measurements. The OMT alone group had a larger ES than BE alone in reference to SDS. However, the OMT ES is substantially less than BE in TROM and marginally less in PF.

When evaluating the data for statistical significance regarding reduction in the incidence of somatic dysfunction based on the intervention, the OMT and BE combined group had a p value of 0.028, the OMT only group had a p value of 0.042, and the BE only group had a p value of 0.09.

Discussion:

The effect size (ES) for the combined group of OMT and BE had the largest magnitude in all three measures, most notably -0.262 in TROM and -0.44 in SD. This indicates that future studies assessing outcomes relative to the combined intervention may require a smaller population to achieve statistically significant outcomes. Given the objective positive outcomes in this group, it is likely that combining OMT and BE may have a synergistic effect on improving the incidence of somatic dysfunctions compared to OMT and BE alone. Conversely, the ES determined for PF measures from all interventions would require a large population to achieve a high enough power to find statistically significant results. The OMT alone group also showed statistical significance for the desired outcome of lessening the somatic dysfunction burden, but not as strong as the combined group. In contrast, the BE alone group did not show statistical significance.

This pilot study demonstrates utility in the biomechanical influence of BE assisting the success of OMT in health maintenance as suggested in prior studies.[8] Combining the two modalities is consistent with our understanding of the reciprocal relationship between form and function within osteopathic manipulative medicine. A weakness in the study was GOT was used and the exact treatments, areas of focus and techniques were not confined to a strict, repeatable protocol.

A negative ES for the thoracic range of motion implies that there was no improvement in all three groups. It is possible that if subjects were more intensely coached to breathe with their abdominal cavity by the examiners at the time of measurement, the data collected may have shown greater improvement. However, subjects were not given any additional coaching on BE during data collection to avoid skewing the measurements. Subjects were given practice guidelines outlined in the BE plan during the initial orientation. The data collectors did make note of their observation that most subjects did not breath through their abdominal cavities during measurements as well as they were during coaching. This begs the question of how length of time and intensity of coaching could be tailored to sufficiently alter the breathing mechanics of the subjects.

Understanding the variables associated with the subjectivity of an osteopathic exam, great care was taken in establishing the scoring system (SDS), treatment methods, and anatomic regions to be scored, so that inter-examiner variability would not be a confounding factor; a potential barrier in osteopathic treatment research.[9,10] It has been further noted that 'consensus training' among examiners has shown to increase the reliability of the palpatory diagnostic testing between examiners.[11]

Conclusion:

The effect sizes (ES) determined by this study could aid in sample size calculations required for future studies. Larger scale studies could be performed to either corroborate or refute the clinically meaningful effects of both OMT and BE as treatment interventions for a progressively positive health maintenance effect.

Author Contributions:

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data, drafting and editing of the manuscript.

Funding Sources: None.

Potential Conflicts of Interest Disclosures: The authors disclose that there were no conflicts of interest or financial support in the development of this project. All data is authentic and accurate.

References:

1) Bordoni B (April 23, 2020) The Five Diaphragms in Osteopathic Manipulative Medicine: MyofascialRelationships, Part 1. Cureus 12(4): e7794. DOI 10.7759/cureus.779
2) Seffinger, Michael A.(2018) Foundations of osteopathic medicine: Philosophy, science, clinical applications, and research. p. 195-220.
3) Dellweg D, Reissig K, Hoehn E, Siemon K, Haidl P. Inspiratory muscle training during rehabilitation in successfully weaned hypercapnic patients with COPD. Respir Med. 2017 Feb;123:116-123. doi: 10.1016/j.rmed.2016.12.006.
4) Grolaux, P.J., Sparrow, T.J. and Lalonde, F., Traditional Osteopathy and the General Osteopathic Treatment: A Historical Concept and a Modern Application. *AAO Journal*, 2021 Dec;*31*(4), pp.39-46.
5) Vranich, B. and Sabin, B. (2020) Breathing for warriors: Master your breath to unlock more strength, greater endurance, sharper precision, faster recovery, and an unshakable inner game. St. Martin's Essentials. p. 34-55
6) Cohen L, Lee C. Instantaneous frequency, its standard dethere wasviation and multicomponent signals. InAdvanced Algorithms and Architectures for Signal Processing III 1988 Feb 23 (Vol. 975, pp. 186-208). SPIE.
7) Pallant JF, Tennant A. An introduction to the Rasch measurement model: an example using the Hospital Anxiety and Depression Scale (HADS). Br J Clin Psychol. 2007 Mar;46(Pt 1):1-18. doi: 10.1348/014466506x96931.
8) Courtney, R. (2011). Dysfunctional breathing: its parameters, measurements, and relevance. (Doctoral dissertation, RMIT University). https://www.aipro.info/wp/wpcontent/uploads/2017/08/DYSFUNCTINAL_BREATHING_ BOOK.pdf
9) Tong HC, Heyman OG, Lado DA, Isser MM. Interexaminer reliability of three methods of combining test results to determine side of sacral restriction, sacral base position, and innominate bone position. J Am Osteopath Assoc. 2006 Aug;106(8):464-8.
10) Degenhardt BF, Snider KT, Snider EJ, Johnson JC. Interobserver reliability of osteopathic palpatory diagnostic tests of the lumbar spine: improvements from consensus training. J Am Osteopath Assoc. 2005 Oct;105(10):465-73.
11) Degenhardt BF, Johnson JC, Snider KT, Snider EJ. Maintenance and improvement of interobserver reliability of osteopathic palpatory tests over a 4-month period. J Am Osteopath Assoc. 2010 Oct;110(10):579-86.