The assessment of pulmonary function after Rib Raising OMT versus standard respiratory therapy

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Introduction

In conjunction to conventional forms of treatment such as medicine and surgery, many osteopathic physicians also use Osteopathic Manipulative Therapy (OMT) either alone or in combination with conventional forms to treat the whole person and improve treatment outcomes. OMT may prove to be beneficial in regards to caring for the pulmonary patient because respiration involves intricate use of the body's musculoskeletal system system (ribs, sternum, clavicle, thoracic spine, intercostal muscles, ligaments, tendons, and fasciae) in changing thoracic pressures necessary for effective breathing.[1]

In a previous study, it was determined that single treatment of various OMT treatments did not have a significant effect on improved pulmonary function as compared to standard pulmonary rehabilitation (SPR).[2] The purpose of this study was to analyze the effect of *repeated* rib raising on pulmonary function compared to standard nebulizer treatment and placebo (soft touch). Improvements in pulmonary function were assessed via spirometry, as determined by forced vital capacity (FVC), forced expiratory volume in one second (FEV1), and the ratio FEV1/FVC. Decreased FVC, FEV1, and FEV1/FVC values are associated with multiple pulmonary dysfunctions, including COPD.[3] The research hypothesis used for this project was: If a healthy individual receives repeated OMT, specifically rib raising treatment, then there will be an improvement in pulmonary function.

Methods

a. Forty-eight healthy participants were recruited for this study. Forty-five participants completed all study procedures (age range: 21-35 years old, median age 24, 47% male**)**. Subjects were given a randomized number and assigned into their treatment group.

b. Study procedures lasted five weeks. Participants received one treatment once a day for five consecutive days. Participants also received the next treatment for another five days, and the last treatment for another five days. They received one week of rest between each series of treatments. The order of treatments were randomized for each subject. An example of the order of treatment is as follows:

Table 1: Study Timeline Example

Week 1	OMT
Week 2	Rest
Week 3	SPR with Nebulizer
Week 4	Rest
Week 5	Placebo with Soft Touch

c. During each treatment, spirometry was utilized to measure FVC and FEV1 and FEV1/FVC ratio.

d. Day 1 Pre-treatment: On day 1 and 5 of each session spirometry was utilized to measure FVC, FEV1, and FEV1/FVC ratio. Three acceptable trials of spirometry were done. All data points throughout the experiment were analyzed to ensure the following criteria[4]:
   - At least two of the three spirometry trials within **150 mL** of each other
   - FEV1 and FVC experimental values at least **80%** of their respective calculated predicted values, based on age, gender, height, and ethnicity)
   - FEV1/FVC ratios at least **70%**

e. Treatment: Given all five days. After each treatment participants subjectively reported their change in breathing on a scale from significantly worse (-2) to significantly better (+2).

f. Day 5 Post-treatment: Three acceptable spirometry trials.

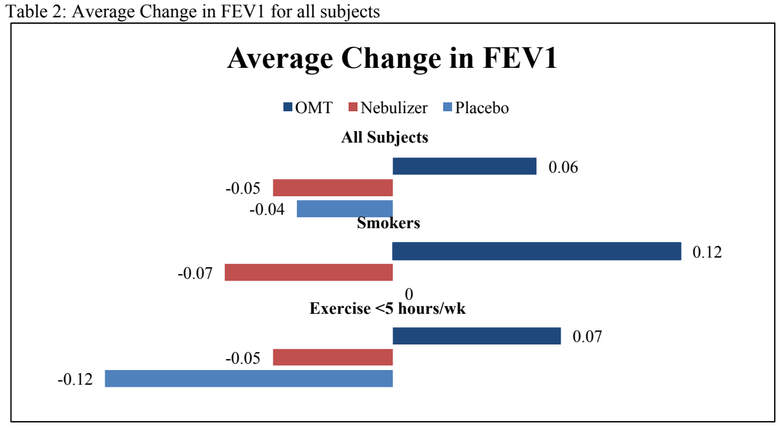
g. The finalized data were analyzed with ANOVA procedure in SAS University Edition. An alpha value of 0.05 was used for interpretation.

Results

Objective Data:

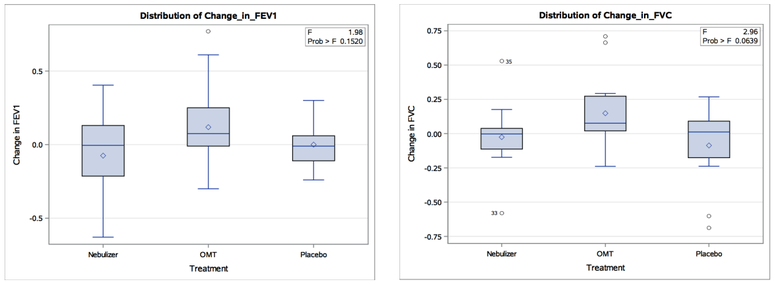
In all, subjects had an increased FEV1 after OMT compared to a decrease in FEV1 in nebulizer and placebo treatments.

Table 2: Average Change in FEV1 for all subjects



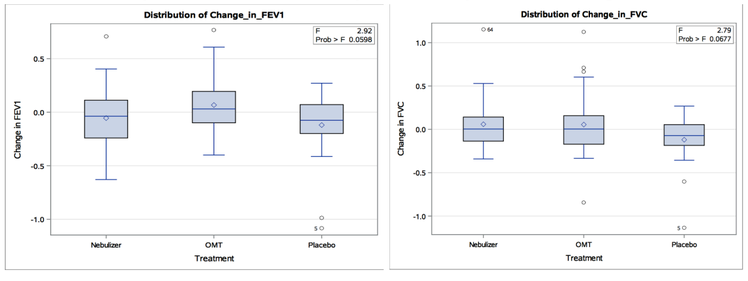
Subjects with smoking histories showed improvement with OMT therapy in FEV1 and FVC, as compared to Placebo and nebulizer treatments. The mean changes in FEV1 and FVC for the rib raising treatment period for only subjects who reported a history of smoking (n=14) were +0.12 L (SD 0.29 L) and +0.15 L (SD 0.26 L), respectively. P-values obtained from FEV1 and FVC ANOVAs including only values from those who reported a smoking history were 0.15 and 0.06, respectively.

Table 3 & 4: Changes in FEV1 & FVC in Smokers



Subjects exercising less than 5 hours per week saw marked improvement in both FEV1 and FVC with OMT. The mean changes in FEV1 and FVC for the rib raising treatment period for only subjects who reported exercising less than 5 hours per week (n=28) were +0.07 L (SD 0.29 L) and +0.06 L (SD 0.38 L), respectively. P-values obtained from FEV1 and FVC ANOVAs including only values from those who reported exercising less than 5 hours per week were 0.06 and 0.07, respectively.

Table 5 & 6: Changes in FEV1 and FVC in subjects exercising less than 5 hours per week

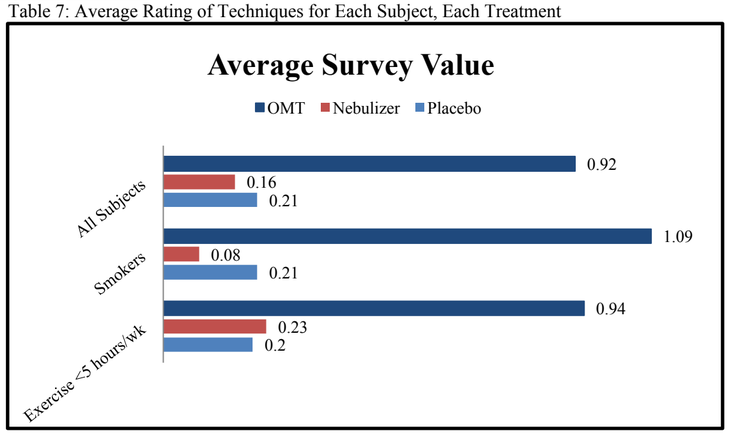


Overall, subjects reported a significant positive impact of the OMT rib raising technique. Survey responses were calculated on a scale from -2 to 2 with a score of 2 being most improvement in breathing ability, -2 being most decline. The mean post-treatment survey response values for rib raising, nebulizer, and placebo treatment periods for all subjects were 0.92 (SD 0.52), 0.16 (SD 0.71), and 0.21 (SD 0.40), respectively. A one-way ANOVA of the survey response values for each treatment period for all subjects was also performed. The p-value from the survey response ANOVA was <0.0001.

Results Continued

Subjective Data:

Table 7: Average Rating of Techniques for Each Subject, Each Treatment



Conclusion

1. **The results of this study support the null hypothesis that there would not be any statistically significant changes in FVC and FEV1.** Since a healthy population was the study target, these results were expected and consistent with previous studies.[2,5] Further applications of this study is proposed to be extended to a sick population with pulmonary morbidities such as pneumonia, asthma, chronic bronchitis, etc.
2. **Subjects that reported a history of smoking showed improvement in FEV1 and FVC, though not statistically significant.** However, in future studies, it would be beneficial to obtain a broader sample population for age and pack year smoking history.
3. **In addition, subjects exercising less than 5 hours a week also saw an improvement, but outside the common significance level of 0.05 used for interpretation.** More detailed reporting of exercise habits and an increased sample size could be used for further applications of this study.
4. **Overall, all subjects reported their breathing improved significantly more with OMT, as compared to the placebo and nebulizer treatments.** However, because this study was done at an osteopathic school, observer-expectancy bias may have contributed to these results. The nebulizer treatments were reported with the lowest overall breathing improvement. This is consistent with the use of hypertonic saline as a component of bronchoprovocation testing and sputum induction.

References

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