



# Clinical Case Report Competition

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First Place Winner

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The lasting effect of cervical myofascial release  
on heart rate and systemic blood pressure

## Abstract

**Objectives:** This study was performed to determine if cervical myofascial release – focused on the sternocleidomastoid and carotid sheath – performed successively, can maintain a decreased heart rate and blood pressure for a period of 10 days.

**Methods:** The study involved 10 treatments of a single female patient aged 23 years old. Blood pressure was taken on a daily basis as well as before and after treatments. Treatments consisted of 50 minutes of myofascial release to the cervical region followed by 10 minutes of cervical Dr. Vodder MLD.

**Results:** Confounding results were obtained showing no strong trends. Following treatment heart rate was decreased an average of 6.7%, systolic blood pressure was decreased an average of 4.0%, and diastolic blood pressure was decreased an average of 0.83%. No statistical analysis was used for these figures.

**Conclusion:** The results obtained do not support the hypothesis as any notable effects were transient. Additional scientific research is needed in this area of study.

**Key Words:** Myofascial Release, Manual Lymph Drainage, Blood Pressure, Heart Rate

**C**ardiovascular disease is one the leading killers in Canada. It accounts for 29% of all Canadian deaths every year (1). The majority of these deaths are either due to heart disease or a stroke. Currently cardiovascular diseases cost the Canadian economy roughly \$22.3 billion annually (2). A condition closely linked to both of these incidences is hypertension. Hypertension is a primarily idiopathic disease though a number of risk factors have been identified.

Wilkins et al state hypertension may be as prevalent as 19% in adults aged 20-79 years old in Canada (3). Current management for hypertension and indeed all cardiovascular conditions include managing risk factors – diet, smoking, activity level, weight, blood pressure, etc – and more commonly pharmaceutical drugs. No attainable research states that massage therapy is used to treat blood pressure, however many papers have been published stating that massage therapy has an effect on

systemic blood pressure  
(4)(5)(6)(7)(8).

The purpose of this study was to determine if massage focused specifically on the carotid sheath and sternocleidomastoid would have a lasting effect on lowering resting heart rate and blood pressure. If the carotid sheath was massaged in rapid succession with minimum downtime between massages, the resting heart rate and blood pressure should be lowered post treatment and remain lowered for an extended period of time – this study was aiming for 10 days following the last treatment. If massage therapy can attain a lasting lowered resting heart rate and blood pressure, the result would be a decrease in the economic burden produced by hypertension and heart disease.

### Case Study Subject

The subject of this case study was a 22 year old female. She is a college student who enjoys the idea of pursuing physical fitness. Her diet is fairly healthy, far exceeding the requirements of the Canada Food Guide. She maintains an active lifestyle, working out at the gym an average of twice a week. She also

enjoys going for walks. She is in the middle of a lifestyle change where she has radically changed her diet and exercise level. When this case study had started she had lost 15 pounds in the previous 3.5 months. By the end of the study she had lost another 5. She has asthma which limits her exercise capabilities. There is a family history of high cholesterol, though she has not had her cholesterol levels checked. Early in 2009 she was the passenger in a motor vehicle accident since which she has suffered chronic back and neck pain. She suffers from transient dizziness and nausea which occurs about once a week. These have been corrected using a number of different methods including, but not limited to, non-steroidal anti-inflammatory drugs, eating a meal, rest/sleep, trigger point release of spinal erectors in the upper thoracic spine, and simply waiting for it to subside. The only medication she takes is a Salbutamol inhaler. Her resting blood pressure is within healthy limits, but her resting heart rate almost borders on tachycardia at times.

## Methods

The study focused on two main measurements – resting heart rate and blood pressure – while a secondary measurement of cervical range of motion was used to determine possible correlation between the results and other causative factors.

Both the resting heart rate and the blood pressure were measured using an electronic blood pressure cuff. The cuff was placed on the left arm superior to the cubital fossa. The measurements were obtained every morning upon arousal. The patient was asked to rise from sleep and remain seated for 2 minutes before attaining these measurements themselves. Both of these measurements were obtained immediately before treatment and directly after treatment, again after remaining seated in an upright position for 2 minutes post treatment. Upon completion of 10 treatments the patient continued to have their resting heart rate and blood pressure monitored for 10 days in the same fashion as previously described.

A secondary measurement of cervical range of motion was used in this case study. Prior to the first treatment the patient's complete

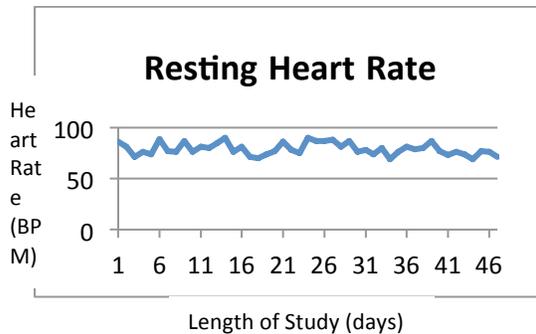
cervical range of motion was determined using a goniometer. This measurement was then measured again before treatments four (4), seven (7), and after the completion of treatment ten (10). Ten days following the completion of the last treatment cervical range of motion was measured.

Massages in this study were 60 minutes in duration. All muscles and structures were treated bilaterally. Times stated in this protocol account for treatment of both sides of the body. The patient began prone. Myofascial reshaping was used for 5 minutes to release upper trapezius and levator scapula. The patient was then turned supine for the remainder of the treatment. Myofascial soft tissue release was used for 15 minutes on splenius cervicis, splenius capitus, semispinalis capitus, suboccipitals, the scalene group and longus coli. 15 minutes was spent using myofascial techniques – bowing, reshaping, passive dynamic release – to release the sternocleidomastoid. 15 minutes was spent using myofascial soft tissue release to decrease the tone of the carotid sheath. The remaining 10 minutes was used to perform the Dr. Vodder MLD cervical treatment.

## Results

No statistical software was used to compute the results, so proper P-values could not be established.

Following each one hour massage, the patient's resting heart rate was decreased between 4.2% and 9.3% (mean 6.7%, standard deviation 1.6%, variance  $\pm 2.6\%$ ). Over the course of the 10 treatments a very weak trend ( $R^2 = 0.0008$ ) was found showing an overall decrease in resting heart rate (Figure. 1). Including the 10 days after treatment #10, the  $R^2$  value increased to 0.0507, again showing a very weak trend of decreased resting heart rate.

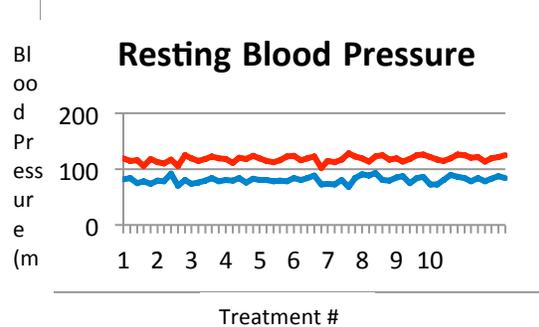


**Figure 1.** Resting heart rate vs. length of study

Subsequent to each one hour massage, the patient's systolic blood pressure was decreased between 1.8% and 6.5% (mean 4.0%, standard deviation 1.5%, variance  $\pm 2.1\%$ ). During the course of the 10 treatments a very weak trend ( $R^2 = 0.1374$ ) was found indicating an

increase in resting systolic blood pressure (figure 2.). If the 10 days following the last treatment are included, the trend becomes even weaker ( $R^2 = 0.1259$ ).

Following each one hour massage, the patient's diastolic blood pressure fluctuated between decreasing by 2.7%, increasing by 1.2% or not changing at all (mean 0.83% decrease, standard deviation 2.6%, variance  $\pm 6.9\%$ ). During the 10 treatment period a very weak trend ( $R^2 = 0.0248$ ) was found revealing an overall increase in resting diastolic blood pressure (Figure 2.). Including the 10 day follow up period, the trend becomes slightly stronger ( $R^2 = 0.0723$ ).



**Figure 2.** Resting blood pressure vs. length of study

Cervical range of motion was noted as having changed very slightly. During the period of 10 treatments, flexion was increased by 2.2%, extension decreased by 1.8%, right side flexion increased by 5.0%, left side flexion increased by 2.6%, right rotation increased by 1.4%, and

left rotation remained unchanged. Counting the 10 day follow-up period, it was observed that flexion increased by 2.2%, extension remained unchanged, right side flexion increased by 5.0%, left side flexion increased by 2.6%, right rotation remained unchanged, and left rotation remained unchanged.

## Discussion

MLD was chosen as a finishing technique as opposed to Swedish massage, because MLD has been shown to reduce autonomic sympathetic tone (6).

As is evidenced by the results, this series of treatments was ineffective for the stated hypothesis. The treatments were successful in acutely lowering resting heart rate. The mean value of decreased heart rate is a fairly positive result for the study, but the small sample size needs to be taken into account contributing for a possible Type I error. The immediate results at first glance support the hypothesis, but unfortunately the results are only transient, lasting no longer than a single night's sleep. Resting heart rate showed no trend in its reaction to treatment the following morning. Heart rate increased as much as 27% the following morning or decreased

as much as 7%. There seemed to be no pattern as to the resultant decrease of heart rate from the previous treatment and the measured heart rate the following morning. The results obtained for heart rate are transient and do not support the hypothesis. Therefore the null hypothesis is determined to be true. One fact to take into account is that the patient is taking a daily dose of Salbutamol for her asthma. A well-known adverse effect of Salbutamol is tachycardia.

Currently carotid sinus massage is used to lower heart rate (4), such as in the case of tachycardia. The carotid sinus massage procedure takes roughly 5 minutes and is therefore superior to the treatment used in this study if a transient effect is the only goal.

The resting systolic blood pressure actually increased overall during the study period. However, the  $R^2$  value is low enough to suggest that no trend exists. Following every treatment the systolic blood pressure decreased, but much like heart rates, the values were brief, lasting only until the following morning. Like heart rate values, the systolic blood pressures obtained in this study suggest that treatments had no lasting effect. In

every treatment the systolic blood pressure decreased immediately following treatment, but again suffers from a lack of continuity when measured the following morning or as a day-to-day trend. Other research suggests that the average light/medium pressure massage generally increases systolic pressure (7). This same research also suggests that a massage 60 minutes in duration will most often increase systolic blood pressure. This research is contradictory to the results obtained in this study. The results of the study show that overall the treatments were ineffective.

Resting diastolic pressure had the least positive results. Immediately following treatment, the diastolic pressure had a number of different reactions. After some treatments the diastolic pressure decreased, after some it didn't change at all, and after others it actually increased. The  $R^2$  value was again low evidencing a very weak trend in the effects of this specific cervical treatment on resting diastolic blood pressure. Research shows a 60 minute massage will generally increase the diastolic blood pressure. Conversely a light/medium massage tends to decrease diastolic blood pressure. This research

partially supports the results acquired in this study (7). Overall the treatment was not effective.

The cervical range of motion, like the other measurements used in this study, showed a very weak or non-existent trend. Three of the six ranges of motion remained unchanged following the 10 day period post tenth treatment. Flexion and left side flexion increased by one degree and right side flexion increased by two degrees. These results don't appear to have any correlation to the results obtained for the other measurements. Furthermore, measuring range of motion using a goniometer is not a reliable method of measurement. The results for cervical range of motion are therefore dismissed as having no significant effect on heart rate or blood pressure.

These results support the hypothesis that massaging the carotid sheath would have the effect of decreasing systolic and diastolic blood pressure, and heart rate. However the hypothesis also included these results as lasting for a period of time – 10 days in this case – so the null hypothesis must be supported as the results were only short-lived, lasting no longer than the following morning.

Major faults of this study include a poor internal validity, the small sample size, lack of statistical analysis, and lack of complete treatment continuity. As best as possible treatments were aimed at being identical to one another, but the human component makes that nearly impossible. The research design may need to be changed to include treatments on a daily basis to really enforce any transient changes. Future research may look at including a systemic autonomic nervous system response to affect blood pressure and heart rate as a systemic effect may be much more efficient than a local response to tissue change. The depth of massage may need to be altered as well, as other research shows that deep tissue massage has a significant effect on the resting blood pressure of the patient.

### Conclusion

This case study was purposed to determine if cervical massage – specifically focused on myofascial release of the sternocleidomastoid and carotid sheath – would create a lasting decrease of resting heart rate and blood pressure in the average population. Ten treatments were

performed every 3 days with a follow up period of 10 days to monitor the lasting effects. Overall the results were inconclusive and scattered showing decreases of some measurements, but increases in others. The hypothesis is not supported. Future research is needed to determine if cervical massage has a lasting effect on heart rate and blood pressure.

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