

Manual muscle testing as an indicator for dysfunction of the cervical spine and the effect of chiropractic treatment on grip strength

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Abstract: *Objectives:* This study aimed to determine if chiropractic adjustments are an effective treatment in the cervical spine and throughout the body, if manual muscle testing can be used to more accurately direct treatment of a chiropractic adjustment, and to see if grip strength can be used as an indicator to determine if the treatment has been successful.

Methods: The data from this study was collected during routine visits to a chiropractic office. Pre-treatment grip strength and post-treatment grip strength were measured using a dynamometer, in patients after a full treatment, cervical spine manipulation only, or as a control group: before treatment, while waiting to be seen.

Results: The group that was given a full treatment was made up of 67 females and 38 males. After the full treatment, the females had an average increase in grip strength of 3.48 kg (7.67 pounds) and with a standard deviation of 2.64 kg (5.82 pounds) and 17.19% and a p value < 0.001. After the full treatment the males had an average increase in grip strength of 4.54 kg (10.00 pounds) and 12.12% with a standard deviation of 3.81 kg (8.41 pounds) and 9.57% and p value of < 0.001. The group that was only given a chiropractic manipulation of the cervical spine was made up of 42 females and 33 males. After the cervical spine only treatment, the females had an average increase in grip strength of 2.44 kg (5.38 pounds) and 11.91% with a standard deviation of 2.42 kg (5.33 pounds) and 12.53% and a p value < 0.001. After the cervical spine only treatment, the males had an average increase in grip strength of 4.45 kg (9.82 pounds) and 13.08% with a standard deviation of 3.92 kg (8.65 pounds) and 13.79% and p value of < 0.001. The control group was made up of 32 people: 22 women and 10 men. It did not show a statistically significant difference in grip strength and had an average increase of 0.06 kg (0.14 pounds) and average decrease of 0.39% with a standard deviation of 5.53 lbs and 9.27% and a p value of 0.89.

Conclusion: This study shows that manual muscle testing is a valid tool to indicate dysfunction of the cervical spine in a clinical setting and that chiropractic treatment is beneficial to the cervical spine and the upper extremities.

Indexing terms: Chiropractic; Applied Kinesiology; Manual Muscle Testing; Grip Strength; Dynamometer; Cervical Spine Manipulation

Introduction

Chiropractic has become a trusted, safe and effective treatment for disorders of the cervical spine and the upper extremities/ (1, 2) Other studies have investigated the peripheral effects of chiropractic manipulation, (6, 7, 8, 9, 10, 11, 12, 13, 14, 15) and some have shown that chiropractic manipulation can result in increased joint position and strength, (6, 7, 8, 9) but none have investigated the effects of a chiropractic manipulation after using manual muscle testing to help determine the need and location of

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treatment. Manual muscle testing has been used in many different techniques to help diagnose and determine the appropriate method of treatment. In Applied Kinesiology, dysfunction of the cervical spine can be detected when a person's wrist extensor is determined to be conditionally inhibited and strengthens after contralateral rotation of the neck. (4, 5)



Objective

Very few studies have been performed that investigate the effects of chiropractic treatment on grip strength and some studies show that intervention decreases strength. (10) In this study, data was collected to determine if chiropractic adjustments are an effective treatment in the cervical spine and throughout the body, if manual muscle testing can be used to more accurately direct treatment of a chiropractic adjustment, and to see if grip strength can be used as an indicator of a successful treatment.

Method

Data were collected in this study from patients' treatment notes. These patients presented for routine visits at a chiropractic office with no deviation from a typical office visit. Patients were included in this study when, during treatment, it was determined that the patient had dysfunction of the cervical spine through manual muscle testing. Dysfunction of the cervical spine was detected when a patient demonstrated a weak wrist extensor, regardless of hand dominance, that strengthened after contralateral cervical rotation. File review retained patient anonymity.

Grip strength was measured with a *Camry* electronic hand dynamometer, model EH101, that was recalibrated at the beginning of each measurement.

To increase statistical significance, at least 32 people were evaluated from each group:

- ▶ male control group;
- ▶ female control group;
- ▶ male cervical spine adjustment group;
- ▶ female cervical spine adjustment group;
- ▶ male full adjustment group; and
- ▶ female full adjustment group.

Due to the demographics of the clinic, the sample size had more females than males in these subgroups: control; cervical spine adjustment group; and full adjustment group.

Pre-treatment grip strength was measured on the side of the cervical spine that was determined to be dysfunctional through manual muscle testing before any treatment was applied. In the treatment groups, post-treatment grip strength was measured after a cervical spine chiropractic adjustment only or full chiropractic treatment, that included wherever the doctor determined it necessary to adjust. This full chiropractic treatment was directed by a diagnosis made by history, physical exam, imaging, palpation and through manual muscle testing. In the control group, the post-treatment grip strength was measured after waiting in the treatment room, usually prone with hot packs on the patient's back or while seated, for 5-10 minutes.

The control was chosen to determine if any increase in grip strength could be due to learning how to use the dynamometer after multiple uses. By recording a measurement before treatment and then after 5-10 minutes, while waiting for the doctor to return for treatment, it gave the patient repeated opportunities to use the dynamometer, while giving him/her enough time to rest to avoid repeated use fatigue.

The full treatment included any area determined to be dysfunctional in the cervical, thoracic, or lumbar spine, any joints of the upper or lower extremity, any soft tissue restrictions, or any

cranial motion restrictions. The adjustments typically used in the cervical spine were a cervical break or long axis traction. The typical adjustments used in the upper thoracic spine were standing cervicothoracic adjustments, combo moves, bench TM or Maigne's adjustments. The typical adjustments used in the lower thoracic spine were Maigne's adjustment or standing thoracolumbar adjustments. The typical adjustments used in the lumbosacral spine were side posture adjustments or pelvic blocks.

Occasionally during the treatment, the grip strength was measured but it was later determined that additional treatment was needed. In these instances, the measurement taken after additional treatment was rendered was the one that was recorded and used in this study.

The grip strength was measured on a calibrated dynamometer. The patients were instructed to hold the device comfortably and then squeeze as hard as possible.

Statistics were analysed to determine:

- ▶ the average change in grip strength, in kilograms (pounds) and in percent change;
- ▶ the standard deviation; and
- ▶ the p value.

Results

- The group that was given a full treatment was made up of 67 females and 38 males.

After the full treatment the females had an average increase in grip strength of 3.48 kg (7.67 pounds) and with a standard deviation of 2.64 kg (5.82 pounds) and 17.19% with a p value < 0.001.

After the full treatment the males had an average increase in grip strength of 4.54 kg (10.00 pounds) and 12.12% with a standard deviation of 3.81 kg (8.41 pounds) and 9.57% with a p value of < 0.001.

- The group that was only given a chiropractic manipulation of the cervical spine was made up of 42 females and 33 males.

After the cervical spine only treatment the females had an average increase in grip strength of 2.44 kg (5.38 pounds) and 11.91% with a standard deviation of 2.42 kg (5.33 pounds) and 12.53% and a p value < 0.001.

After the cervical spine only treatment the males had an average increase in grip strength of 4.45 kg (9.82 pounds) and 13.08% with a standard deviation of 3.92 kg (8.65 pounds) and 13.79% and p value of < 0.001.

- The control group was made up of 32 people, 22 women and 10 men, and did not show a statistically significant difference in grip strength and had an average increase of 0.06 kg (0.14 pounds) and average decrease of 0.39% with a standard deviation of 5.53 lbs and 9.27% and a p value of 0.89.

Discussion

The overall results of this study show that both a cervical spine adjustment and a full spine adjustment significantly increase the grip strength, while the control group showed that there is no statistically significant improvement in grip strength. These results suggest that chiropractic adjustments are an effective treatment of the cervical spine, manual muscle testing can be used to determine the location to apply treatment to improve the function of the cervical spine, and grip strength can be a valid tool to determine the effectiveness of an adjustment.

The lack of statistical significance in the control group suggests that the method of control is an adequate way to create a control group for the use of a dynamometer in the measurement of

grip strength. There was a similar amount of time between both the treatment groups and the control group, which would suggest that any statistically significant finding has to do with factors other than the repeated use of the dynamometer. The major drawback to this method is that, due to the clinical setting, the time the patient spent waiting between pre and post grip strength measurements could have been longer than the time spent between pre and post grip strength measurements in the treatment groups.

The p values in the full treatment and cervical spine only treatment, in both males and females, were all below 0.001. This suggests that the cause of the increase in grip strength is because of the treatment that was administered. The use of manual muscle testing was used in this study and not in Molouki et al (10) and suggests that manual muscle testing is beneficial in determining the location that the chiropractic treatment is applied.

The increase in post treatment strength was greater in the males than the females in kilograms (pounds), but not always in the percent increase in strength.

In the full treatment there was an increase in grip strength of 3.48 kg (7.67 pounds) in females and 4.54 kg (10.00 pounds) in males with a percent increase of strength of 18.71% in the females and 12.12% in males. In this group the males had a larger increase in strength, but females had a larger percent increase in grip strength.

In the cervical spine only group there was an increase in grip strength of 2.44 kg (5.38 pounds) in females and 4.45 kg (9.82 pounds) in males with a percent increase of strength of 11.91% in females and 13.08% in males. In this group the males had a larger increase in strength and a larger percent increase in strength.

In some of the groups the grip strength improved more in the full treatment group than in the cervical spine only group. However, the standard deviation was always higher in the group that had the larger increase in strength. In the female group the findings suggests that treatment of the entire body would be better for the patient but in the male group the findings suggests that treatment of the cervical would be better for the patient. Since the results do not show a consensus, but there is improvement in both groups, it does not suggest that treatment of only the cervical spine or treatment of the whole body is superior but does suggest that treatment is beneficial.

Although the control group rules out the idea that repeated use of the grip strength dynamometer could increase the patient's strength, it does not rule out that other parts of the chiropractic adjustment could have helped contribute to the overall increase in grip strength

Conclusion

This study concludes chiropractic adjustments are an effective treatment in the cervical spine and throughout the body, manual muscle testing can be used to more accurately direct treatment of a chiropractic adjustment, and grip strength can be used as an indicator of successful chiropractic treatment. In the control group, there was no statistically significant change in pre and post grip strength. However, after both a full treatment or only chiropractic manipulation of the cervical spine, there was a statistically significant increase in pre and post grip strength. More studies should be done to investigate if muscle testing and grip strength can be used as valid tools to determine dysfunction of the spine and extremities and the need for chiropractic treatment.

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Conflict of interests

The author declares no known conflicts of interest.

Consent

Consent was not required as this study reviewed patient files and no patient is identified.

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