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Case Report

Comparing Pre-Post Heart Rate Variability Change between Two Spinal Adjustments: A Case Study

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Abstracts

This case report highlights an example of how neurological effectiveness can be compared between two spinal adjustments given to the same patient. In one of the adjustments there was negligible benefit according to heart rate variability while the other showed substantial improvement. This example may be of interest to clinicians who wish to compare interventions given to an individual patient to determine if one intervention was more beneficial than the other.

Introduction

A traditional goal of chiropractic care is to improve neurological function with spinal adjustment. This adjustment is indicated if there is neurological dysfunction, eg, dysautonomia, coupled with a slight vertebral misalignment. This condition is referred to as a chiropractic *vertebral subluxation* [1].

As with various interventions in the different health care disciplines, sometimes an intervention is effective and sometimes it is not. A plethora of robust research exists comparing treatments at the *group* level as with randomized clinical trials. At the individual level in the clinical setting however, a dearth of literature exists. This case study provides an example of how neurological effectiveness in chiropractic care can be compared between two instances of spinal adjustment for the same patient where heart rate variability (HRV) was the measure.

Methods

The Institutional Review Board at Purdue University Global found that this case report met exemption criteria. The patient is an adult female who gave consent for this case study and was analyzed and adjusted by the author.

HRV was measured using the *Heart Rate Variability Logger* app [2] with its companion ear clip sensor [3]. The set-up has good agreement with standard ECG technology [3,4]. The HRV statistic used was the time domain metric, *root mean square of successive differences* (*rMSSD*). In this report the terms *rMSSD* and *HRV* are used interchangeably. Larger *rMSSD* values, measured in milliseconds reflect a healthier, more adaptive autonomic nervous system [5]. This is important since autonomic activity is involved with many vital functions such as body temperature, heart rate, blood pressure, and digestion.

The author selected two adjustments he provided for the patient, months apart, to be compared to each other, each having their respective pre-post comparison (intra- and inter-visit comparisons). In one adjustment there was obvious negligible neurological benefit according to line graphs of the HRV values while the other adjustment showed an obvious benefit (Figure 1).

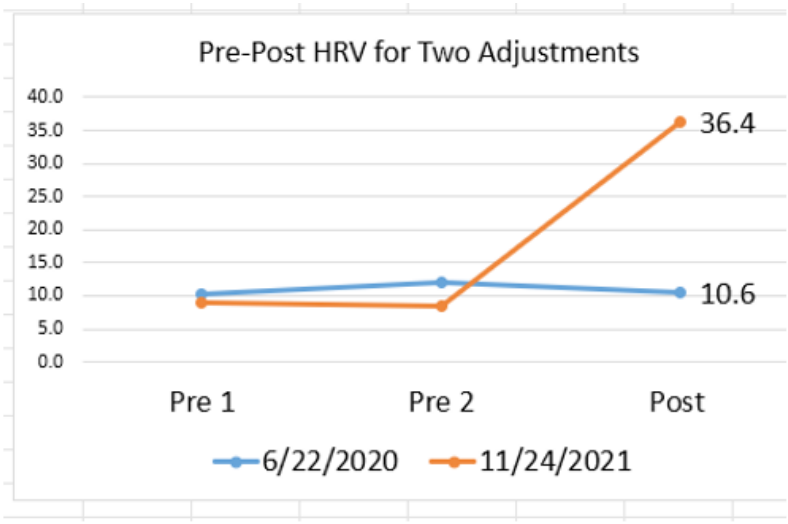

Figure 1: HRV findings for two adjustments months apart.

The following apply to both adjustments:

a) Neurological assessment / need for an adjustment was based on the HRV findings

b) Thirty second recordings were made for two pre-adjustment readings and one post-adjustment reading. Thirty second HRV readings have good agreement with 5-minute measurements [6].

c) The HRV measurements were obtained in the context of a single office visit, about 5 minutes apart between the two pre and one post readings.

d) The atlas vertebra was found to be subluxated and was adjusted in the recumbent position, in the same direction using a gentle thumb-move type thrust contacting the atlas transverse process

e) Atlas misalignment direction was determined by a previous x-ray and same-visit palpation.

A difference between the two adjustments was time of day they were given: Early morning for the effective adjustment and later in the day for the ineffective adjustment.

The HRV measurements were charted in Excel and analyzed for statistically significant outliers using an online calculator that used Grubb's test [7]. The minimum number of numerical values for this test is three [7].

Results

Figure 1 shows HRV results *pre* versus *post* for both adjustments. The blue (relatively level) line represents findings for the ineffective adjustment (6-22-20), where HRV did not increase following the adjustment. The orange line represents the effective adjustment (11-24-21), where HRV *did* increase (improve) following the adjustment. Additionally, the post finding for the latter (effective adjustment; the 36.4 ms) was a statistically significant outlier ($p < 0.05$) among the three readings (two pre and the one post) on that visit, further substantiating HRV improvement with this adjustment (on 11-24-21) (Figure 1).

Discussion and Conclusion

This report provides an example of how neurological effectiveness can be compared between different chiropractic adjustments. In this case study, one adjustment showed neurological improvement according to HRV while the other adjustment did not.

Future studies could include: a) more patients, and b) a focus on various factors that could influence neurological outcomes such as time of day when the adjustment was given.

Conflict of Interest

No Conflict of interest.

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