Resting Pulse Rates Under Chiropractic Care: A Preliminary Practice-Based Study

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Abstract

Introduction: Effectiveness of a health care intervention is of interest to patients and providers. One of the objectives in this author's chiropractic practice, beyond symptomatic relief, is to improve nervous system health in the patient. Such improvement helps the patient to better self-heal, which is a core element in chiropractic philosophy. The present study compares a measure for neurological health in the author's practice before and after spinal adjustment. The measure used was resting pulse rates (RPR). Research indicates that a lower RPR is a sign of better health compared to a higher RPR.

Methods: The study is practice-based with 10 patients being identified who fit the inclusion criteria. After approximately 3 weeks of care, initial RPR were compared to final RPR for each patient using the paired t test and effect size statistics.

Results: Most patients experienced symptomatic relief by the end of the 3 week study period. Average initial RPR was 80.3 beats per minute (BPM) which decreased (improved) to 74.7 BPM for final RPR. This improvement (from initial to final RPR) was statistically significant ($p = 0.04$) with a moderate effect size (of 0.39).

Conclusion: In this preliminary practice-based study, patients experienced an important benefit beyond symptomatic relief, namely, in the form a healthier functioning nervous system, evidenced by a statistically significant decrease in resting pulse rates.

INTRODUCTION

The effectiveness of a health care intervention is a matter of interest to providers and patients. The intervention at this author's practice is spinal adjustment for vertebral subluxation and is the focus of the present study. A vertebral subluxation is a condition where a vertebra (backbone) has become misaligned to the point of disturbing nerve function in the spinal cord and/or spinal nerves. This is not a healthy situation because the nerve system controls so many vital functions in the body. The purpose of adjusting vertebral subluxation at this office, above and beyond symptomatic relief, is to improve neurological health in the patient. Improving neurological health helps patients become stronger, thereby further helping them to better heal themselves of what ails them. Self-healing with a healthier nervous system is a core element in chiropractic philosophy.

A convenient measure to assess neurological health in chiropractic practice, first proposed by the author in 2012, [1] is resting heart rate. When obtained by counting the beats while palpating a peripheral artery such as the radial artery at the wrist, the assessment is sometimes called resting pulse rate. This term, resting pulse rate (RPR), is the term that is used to describe the assessment in the present paper.

RPR is a good fit for subluxation-based chiropractic practice because it (RPR) is considered a neurological measurement. [2-5] RPR is one of many functions that the nervous system controls in the body. In addition, RPR has: a) outcomes research support, indicating that people with a lower RPR tend to be healthier (e.g., they tend to live longer) than their counterparts who have a higher RPR; [6-8] b) good agreement with resting heart rate derived from electrocardiogram technology; [9] c) good (inverse) agreement with heart rate variability (another neurological measure), where lower RPR (a healthy finding) correlates well with higher heart rate variability (also a healthy finding); [10] d) evidence that it improves following chiropractic care; [11-15] and e) user-friendliness.

The author uses RPR in his neurologically-focused chiropractic practice in a novel way, to help him determine: a) when the patient needs an adjustment, and b) efficacy of his spinal adjustment. The purpose of this preliminary practice-based study is to address the author's question as to whether neurological health is improved in his patients following their spinal adjustment. The measure for improvement in this study is RPR.

METHODS

The patients in the study are from the author's general chiropractic practice and gave their consent for their data to be used in the study. The patients sought care typically for neuromusculoskeletal type symptoms. Inclusion criteria for the patients in the study were: a) they received at least 3 weeks of care, and b) their RPR measurements were obtained within the same hour on their different day appointments. The criterion of 3 weeks of care is based on the author's experience that RPR tends to improve (decrease) after this length of time after the first spinal adjustment. The criteria of same hour is based on the probability that an individual's RPR may vary at different times of the day, e.g., slower before lunch versus after lunch.

The initial RPR in the study, which was the one obtained immediately before the patient's first spinal adjustment, was compared to a final RPR, which was the one at least 21 days after the initial RPR. The final RPR reading was also obtained prior to any intervention on that visit. Some patients had RPR measurements beyond 21 days and their "final" RPR selected was the one that was closest to the 21 day mark. Ten patients met these criteria in the author's new chiropractic practice.

RPR protocol

Following approximately 5 minutes of seated rest, RPR was obtained at the wrist, palpating the radial artery and counting the beats for a full minute, while the patient remained in the seated position.

Chiropractic care

Patients were assessed for vertebral subluxation. [16] The assessment consisted of: a) temperature pattern analysis, b) RPR, c) leg length inequality, d) palpation, and e) when necessary, x-ray. The only intervention provided was spinal adjustment, when indicated by the aforementioned neurologically-based items a-c. The levels of subluxation adjusted typically consisted of atlas (C1) and/or pelvis. This approach is based on the author's practice preference and viewpoint that these levels represent the main areas of subluxation in the human spine. The author further opines that this is particularly the case for atlas, a level that contains more neurology than anywhere else in the spine.

Spinal adjustment for atlas subluxation was performed by contacting its transverse process on the side of laterality, using toggle recoil with a drop piece mechanism; or with a hand-held percussion type instrument. Adjustment for pelvic subluxation was done by contacting the appropriate iliac spine (depending on the direction of its misalignment).

Data analysis

Histograms for initial and final RPR data variables, with 10 RPR observations for each variable (from the 10 patients), did not show substantial departure from a normal distribution. Thus, initial and final RPR were compared using the paired t test with a two-tailed p-value. Although sample sizes for the two variables are relatively small, such sizes may nonetheless be appropriate for a t test. [17] A p-value less than or equal to the conventional alpha level of 0.05 was considered statistically significant. The p-value in this case indicates the probability that the difference between initial and final RPR happened by chance alone. To assess the magnitude of the difference between initial and final RPR, an effect size statistic was also included, using a pooled standard deviation in its formula. An effect size of 0.01 - 0.19 is considered small, 0.20 – 0.49 moderate, and 0.50 and greater is a large effect. [18]

RESULTS

The 10 patients consisted of 6 females and 4 males, with an average age of 52.4 years old (standard deviation [SD] = 14.2). Only one patient reported a lifestyle change that could affect RPR (exercised more intensely). One patient had received care within approximately 3 months prior to the initial adjustment; three patients received chiropractic care 6 months prior; for the remaining 7 patients it had been years since receiving any chiropractic care, or never received prior chiropractic care. Thus, any lingering effects from previous chiropractic care were considered to not be a factor in the study.

Most of the patients experienced improvement with their presenting symptoms at the 3 week mark. Average time between initial and final RPR was 28.2 days with an average of 4.3 visits, and an average of 3.0 adjustments per patient (Table 1). The reason adjustment number is less than visit

number is because on some visits the spinal exam indicated an adjustment was not needed.

Average initial RPR was 80.3 beats per minute (BPM), which decreased (improved) to 74.7 BPM for final RPR. This 5.6 BPM reduction (improvement) from initial to final RPR had: a) a statistically significant p-value (of 0.04), b) a 95% confidence interval (of 0.2 BPM to 11 BPM), and c) a moderate strength effect size (of 0.39).

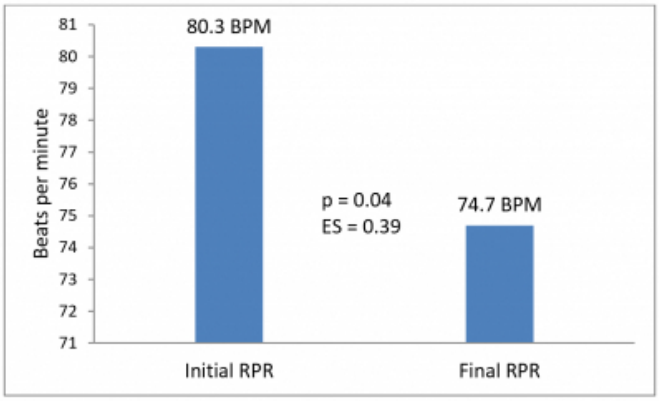
Table 1

Summary statistics. Pts = number patients. SD = standard deviation. Days = number of days between initial and final RPR. Visits = number of office visits. Adjustments = number of spinal adjustments. Initial RPR = RPR immediately prior to first adjustment. Final RPR = RPR at end of study, greater than or equal to 21 days. RPR diff = final RPR minus initial RPR (final – initial), where the minus sign indicates a reduction (improvement) in final RPR.

Variable	Pts	Average	SD	Minimum	Maximum
Age	10	52.4	14.0	32	69
Days	10	28.2	8.7	21	49
Visits	10	4.3	0.7	3	5
Adjustments	10	3.0	1.5	1	5
Initial RPR	10	80.3	16.2	59	113
Final RPR	10	74.7	11.9	56	100
RPR diff	10	-5.6	7.5	-22	3

Figure 1

Graph of average initial and final resting pulse rates (RPR) with inferential statistics (p = p-value, ES = effect size).



DISCUSSION

This preliminary practice-based research is the author's first step in investigating the neurological effectiveness of his care. Future research is planned to: a) include more patients, and b) longer study period times, e.g., minimum of 4 weeks of care, and then 5 weeks, etc.

Overall in the present study, patients experienced improved neurological health following approximately 4 office visits and 3 spinal adjustments, evidenced by the reduced (improved) RPR. Although observational studies such as this do not allow a claim of cause-and-effect, it is nonetheless reasonable to theorize that the RPR improvement may be due to the chiropractic care since: a) lifestyle changes remained largely unchanged during the study, and b) the statistically significant p-value indicates that the RPR improvement did not happen by chance alone. In addition, the 95% confidence interval for the RPR reduction indicates that 95 out of 100 future studies of other similar groups of patients from Hart Chiropractic can also expect to show an RPR reduction of 0.2 BPM to 11 BPM.

Statistical significance does not necessarily mean that there is clinical significance. However, a reduction of 5.6 BPM is likely to be clinically significant since previous research shows that a change as small as 1 BPM is associated with a 1% change in mortality (death rate) risk, at least for patients with hypertension. [19] Accordingly, the 5.6 BPM decrease in the present study could translate into a 5.6% reduction in mortality risk.

Limitations to the study are that: a) results may not apply to other practices, given the variation from one practice to another; and b) the sample size is small (due to it being a preliminary study in a new practice).

A third limitation to the study is a possible white-coat effect. The reason for mentioning this is because it could be argued that the patients may have become more relaxed in visits that followed the initial (high RPR) visit. However, a white coat effect presumably applies to all visits where a clinician tests the patient (versus the patient self-testing in the comfort of their own home). A literature search did not reveal any studies showing that a white coat effect diminishes with subsequent office visits. Indeed, about half of the patients (4 out of 10) in the present study did not show a reduced RPR on their second visit (prior to their 21 days of care).

CONCLUSION

This preliminary study showed a benefit from chiropractic adjustment in this practice above and beyond symptomatic relief. In particular, a statistically significant improvement (decrease) in average resting pulse rate was achieved for this group of patients after approximately 3 weeks of care (four visits, 3 adjustments). Further research is planned with larger sample sizes and longer study period times.

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