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Short-Term Stability of Resting Pulse Rates in Chiropractic Students

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Abstract

Objective: This study assessed the short-term stability of resting pulse rate (RPR) over an approximate 10-minute period in college students.

Methods: Thirty-one students were recruited as a convenience sample. The RPRs were manually measured in the seated position after 1, 3, 5, 7, and 9 minutes of seated rest. The RPRs were compared by rest time in repeated-measures analysis of variance.

Results: Mean RPR increased by 1.9 beats per minute (BPM) from 1 minute of pretest rest to the 3-minute measurement ($P < .05$) and by 1.5 BPM from 3 minutes to 5 minutes ($P > .05$). Among the 5-, 7-, and 9-minute pretest rested readings, a difference of less than or equal to 0.6 BPM was observed. Statistically significant differences were observed for (*a*) all comparisons involving the 1-minute rested measurement and (*b*) the 3- and 7-minute rested measurement. Overall, RPRs began to stabilize beginning with the 5-minute rested measurement.

Conclusion: In this sample of participants, RPR measurements could stabilize after a minimum of 5 minutes of pretest rest.

Introduction

Short-term variability of physiologic findings in practice can be problematic. For example, findings from palpation of the patient's spinal musculature during the first minute of seated (or recumbent) rest may become different in the second or third minute of rest. This may not be a problem from visit to visit if the procedure is performed with the same amount of pretest rest time (eg, 1 minute of rest before the test for all visits). Unless timing for rest times is performed, it is probably unknown exactly how long the patient rests before examination.

Previous research in chiropractic along these lines has been conducted on paraspinal thermography with the use of a pattern calculator. That study revealed, on average, variability of thermal patterns during approximately the first 15 minutes of acclimation to room temperature (with gown opened in the back).[1] An individual patient's thermographic pattern may show consistency between visits with shorter acclimation times that are consistently used, but this would need to be tested. Short-term stability/repeatability of most physiological assessments performed in chiropractic

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examinations (such as muscle and motion palpation, and leg length inequality tests) within a short (eg, 10 minutes) pretest rest period remains largely unknown. Thus, it is important to test the short-term stability of our neurophysiological measures if these measures are to be compared in a series. Comparing a neurophysiological measure that had a pretest rest period of only 1 minute to a subsequent measure having a 5-minute pretest rest period may not be valid because different rest times likely result in different findings. Controlling for the variable of pretest rest time will help to increase the validity of such comparisons between visits.

Manually derived resting heart (pulse) rate (RPR) is a potentially useful neurophysiological option for assessing the patient's nervous system in chiropractic practice. The theory is that an elevated RPR signals the presence of a neurological disturbance and therefore possibly a need for a spinal adjustment.[2] Interestingly, RPR (manually derived) shows good agreement with heart rate derived from an electrocardiogram (ECG).[3,4] The notion that RPR is a measure of neurological function is supported by the following from the scientific literature:

1. "Dysregulation of the autonomic nervous system …[is] indicated by elevated resting heart rate."[5]
2. "Resting heart rate [is] a low tech and inexpensive measure of autonomic tone…."[6]

Although there are other methods to monitor nervous system function, such as nerve conduction velocity, RPR has an advantage of being sufficiently user-friendly to conveniently allow use on all patient visits (vs only periodically as higher-tech methods are intended). Resting pulse rate is another option that may be of interest to chiropractors looking for an evidence-based neurological assessment that is sufficiently user-friendly to be included on all patient visits.

Resting pulse rate is supported by outcomes research showing that a lower RPR tends to be associated with improved outcomes compared with a higher RPR.[7,8] Sensitivity and specificity for a cutoff of 78 beats per minute (BPM) for RPR (less than 78 healthier than 78 or higher) have been reported in a study of Brazilian patients when considering mortality for cardiovascular and all causes.[9] In addition, a change as small as 1 BPM has been found to be clinically significant in hypertensive patients.[10] In a study of relatively healthy persons, in those whose RPR increased to greater than 85 BPM over an approximate 10-year period from 70 to 85 BPM showed a greater mortality risk compared with those whose RPR was less than 70 BPM.[11]

There is some evidence that RPR improves (decreases) following chiropractic care,[12,13] but the reduction is sometimes not statistically significant.[14] In one study, a short-term statistically significant reduction in resting heart rate was observed in an intervention group (thoracic manipulation), but this was also observed in the sham group.[15] In addition, a recent study revealed RPR as having a good (moderate strength) correlation with another, perhaps more well-known neurological assessment in chiropractic—heart rate variability.[16] Still, further research is needed to determine whether improvement in patient-centered outcomes is associated with the lowered RPR following chiropractic care. Further research may also reveal whether RPR decrease following chiropractic care is or is not more beneficial (according to outcomes research) compared with RPR decrease following a fitness approach such as exercise. As an autonomic measure, RPR is hypothesized to be a useful indicator for the neurologically based chiropractor not only for determining when to adjust the patient but also as an outcome measure.

A potential problem in any research on RPR is that different studies using RPR may use different pretest rest times, in which case it would be important to know whether the different times may affect different RPR measurements. As common as the RPR procedure is, its short-term stability appears to be unknown. This is evidenced by the lack of findings in a literature search conducted on January 10, 2014, in Bing, Google Scholar, and PubMed using key words *Short-term stability of resting heart rate*, *short-term stability of resting pulse rate*, and *pulse rate and reliability* (on October 6, 2014). Thus, little is known about the effect of pretest rest times on RPR.

A common pretest rest period in research for measuring RPR is 5 minutes,[17] but in practice, the pretest rest period may not be strictly timed. This is not surprising because standard textbooks on physical examination for practice typically do not include a discussion of pretest rest periods for RPR.[18,19]

For practitioners who may not strictly time a pretest period for RPR, a reasonable estimation of the pretest rest time may be appropriate and useful to gain confidence that the patient has adequately rested before examination. For example, the practitioner may not know exactly how long the patient has rested but may know that the patient has rested at least a certain amount of time before the examination. If research shows that RPRs tend to stabilize after a certain amount