

Neck static stretching acutely reduces blood pressure through reduction of tissue stiffness: A randomized crossover trial

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Study Protocol

This study hypothesised that static stretching (SS) of the right posterolateral cervical region would elicit a reduction in blood pressure (BP), potentially mediated by specific physiological mechanisms. Accordingly, the aim of this study was to investigate the acute effects of SS of the posterolateral neck region on BP and to explore the potential moderating roles of tissue hardness (TH) and heart rate variability (HRV). Twenty-five healthy participants were enrolled in a randomised crossover design. Each participant completed two experimental conditions: a SS session (SS) and a control condition (CC). The order of conditions was randomly determined using the website www.randomizer.org. During each visit, measurements were obtained at two time points: baseline (T0, upon arrival) and immediately after the assigned condition (T1). At each assessment point, outcomes were collected in a standardised sequence: BP was measured first, followed by bilateral assessments of TH adjacent to the seventh cervical vertebra (C7), and subsequently by recordings of HRV and heart rate (HR). Between T0 and T1, participants either performed the static stretching protocol (SS) or completed a 6-minute seated rest period (CC), with the duration of the control period matched to that of the stretching intervention.

Statistical Analysis Plan (SAP)

Data will be expressed as means \pm standard deviations. Baseline comparisons between conditions (SS vs. CC) will be assessed using paired *t*-tests for all variables. To evaluate the effects of time (T0 Vs. T1) and condition (SS Vs. CC), a repeated-measures ANOVA (2×2 design) will be performed. When significant time \times condition interactions are identified, post hoc analyses with Scheffé adjustments will be conducted to determine specific within- and between-condition differences. Effect sizes (ES) will be calculated for all primary analyses, with partial eta squared (η^2_p) used as the index of ES. The magnitude of effects will be interpreted as small (0.01–0.059), moderate (0.06–0.139), or large (≥ 0.14). All statistical analyses will be performed using Jamovi software (version 2.6.13.0; The Jamovi Project, 2025; <https://www.jamovi.org>), with statistical significance set at $p < 0.05$.