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The acute effect of ‘breaking-up’ prolonged sitting on cardiovascular risk factors in overweight/obese adults

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Introduction: We have recently shown in a controlled laboratory setting that regularly ‘breaking up’ prolonged sitting with frequent short bouts of light- or moderate-intensity walking activity acutely lowers postprandial blood glucose and insulin concentrations. However, we are yet to report the effect of interrupting sitting time on secondary outcomes relating to cardiovascular disease. Consequently, we compared the effect of a single prolonged (7-hour) bout of sitting with a similar duration of sitting combined with intermittent bouts of light-intensity or moderate-intensity activity on blood pressure, blood lipids and CRP.

Methods: Overweight/obese adults (n = 19; age range 45–65 yrs) were recruited for a randomized three-week, three-treatment acute cross-over trial: 1) uninterrupted sitting; 2) seated with 2-minute bouts of light-intensity walking at 3.2 km/hr every 20 minutes; and 3) seated with 2-minute bouts of moderate-intensity walking at between 5.8–6.4 km/hr every 20 minutes. Following the completion of baseline measurements and an initial 2-hour steady-state period, participants consumed a standard test meal (75 g glucose, 30 g fat). Serum triglycerides were assessed hourly to calculate the incremental area under the curve (iAUC) and high sensitivity C-reactive protein (hsCRP) was assessed at baseline and 7 hours. Seated brachial artery blood pressure was also measured every hour as a single measurement, 5 mins prior to each activity bout, with an automated oscillometric blood pressure monitor (Philips SureSigns VS3 Monitor). GEE models were adjusted for sex, age, BMI, fasting blood pressure and treatment order.

Results: Systolic blood pressure decreased similarly and significantly during the light and moderate-intensity activity conditions [light: 120 ± 4 mmHg (hourly mean ± SEM), p = 0.002; moderate: 120 ± 3 mmHg, p = 0.02] compared to uninterrupted sitting (125 ± 4 mmHg). Diastolic blood pressure was also significantly reduced with both activity conditions (light: 78 ± 3 mmHg, p = 0.006; moderate: 78 ± 3 mmHg, p = 0.03) compared to uninterrupted sitting (79 ± 3 mmHg). No significant group differences were observed in triglyceride iAUC, hsCRP and the hourly measurement of heart rate.

Discussion: These findings indicate that breaking up prolonged sitting with frequent short breaks of either light or moderate-intensity physical activity may have favourable effects on seated blood pressure. Further studies are needed to evaluate the chronic effects of breaking up sedentary time on cardiovascular disease risk factors and the feasibility of such strategies in the general community.

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