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The effect of lowering salt intake on blood pressure and biochemical indices of cardiovascular and bone health in adult subjects with slightly elevated blood pressure

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There is evidence that relatively modest restrictions in salt intake have the potential to produce a significant fall in average blood pressure (BP) at a population level with a concomitant substantial impact on the burden of morbidity and mortality from CVD[(1)]. Reducing salt intake may also impact positively on skeletal metabolism, as a high salt diet increases urinary Ca loss and bone turnover[(2)]. Two food groups (meat and fish (especially processed meats) and bread) account for over 50% of salt intake from foods in Ireland, with the remainder contributed by various other processed foods[(3)]. The aim of this study was to examine the effect of dietary salt restriction on BP and biochemical markers of bone turnover in free-living adults with slightly elevated BP (stage 1 hypertension). Low-salt bread (0.3 g/100 g)[(4)], unsalted spread and reduced salt luncheon meats formed key elements of the dietary salt restriction approach.

Ninety-six Caucasian men and women (mean age, 46.7 years) with a resting systolic BP ≥ 120 and <160 mmHg and/or a diastolic BP ≥ 80 and <95 mmHg (who were not taking any anti-hypertensive medication) were recruited and randomly assigned to follow either the reduced-salt diet or their usual diet (control) for 5 weeks and then cross-over to the alternate dietary regimen for a further 5 weeks. Systolic and diastolic BP was measured at baseline and endpoints with the OMRON 705-IT automated BP monitor. Urinary Na was measured in 24 h urine collections. The completeness of the 24 h urines was assessed by creatinine and only those adjudged complete were used in the statistical analysis. Osteocalcin, bone-specific alkaline phosphatase, C-terminal telopeptide of type 1 collagen (CTx) and parathyroid hormone (PTH) were analysed in serum and N-terminal telopeptide of type 1 collagen (NTx) in urine by ELISA methods.

The mean daily urinary Na output decreased significantly (from 6.3 to 4.6 g salt/d) on the reduced-salt dietary regimen (see Table). While diastolic BP was unaffected by dietary salt regimen, systolic BP was significantly reduced (by 3 mmHg on average) on the reduced-salt diet. This effect remained after adjustment in regression model for potential confounding effect of age, sex, weight, smoking and vitamin D status ($\beta = -6.04$; $P = 0.001$).

	Usual Na		Reduced Na		
Diet period	Mean	SD	Mean	SD	*P*-value*
Urinary Na (mmol/d)	108	54	79	35	0.0001
Systolic BP (mmHg)	134	12	131	11	0.0001
Diastolic BP (mmHg)	85	9	85	8	0.8

*P-value for treatment effect, there was no significant ($P > 0.4$) carry-over effects.

There was no significant effect of dietary salt regimen on the serum or urinary makers of bone turnover (data not shown).

In conclusion, consumption of a low-salt bread, unsalted spread and reduced-salt luncheon beef and turkey together with other pragmatic advise for limiting salt intake lead to a significant reduction in systolic BP in this group of adults with stage 1 hypertension, illustrating that a dietary approach to BP reduction is a sensible first step. There was no beneficial effect of reducing dietary salt on the rate of bone turnover.

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