

Recommendation 3

Should patients with confirmed hypertension be offered dietary advice concerning salt restriction, compared with no salt restriction?

Critical outcomes – blood pressure

Good quality evidence is available indicating that reduction in dietary sodium intake lowers blood pressure.

The approximate effect of the reduction of 5 g/day of salt on systolic blood pressure is -5 mmHg and -3 mmHg on diastolic blood pressure.

There is also some evidence that the restriction of salt intake improves the BP reducing effect of ACEI, ARB-s, BB-s.

There is limited observational evidence that the advice to reduce dietary sodium intake may lower cardiovascular event rate.

There is no reported research on harms.

Guidelines

All of the reviewed guidelines recommended that hypertensive patients should limit salt intake. In seven of the guidelines (VHA, BHS, CMA, WHO, SIGN, ICSI, JNC,) specific recommendations were given regarding the maximum daily amount. While two simply recommended it be reduced (NZ, SA), eight guidelines gave practical suggestions on how this recommendation might be implemented (BHS, CMA, ICSI, WHO, SA, SIGN, JNC, ESH). Two offered no suggestions on how salt reduction might be achieved (NZ, VHA). Six guidelines (BHS, CMA, WHO, SIGN, ICSI) offered differing estimates, in the range 2-10/2.4-5 mm Hg, of the potential benefit salt reduction could have on blood pressure.

References

A meta-analysis of 56 trials was performed to evaluate the evidence on the effect of sodium restriction on lowering blood pressure in normotensive and hypertensive individuals. 28 trials included 1131 hypertensive subjects. Trials showed significant heterogeneity. Publication bias was also evident. Decreases in systolic blood pressure in response to sodium restriction of 100 mEq/day were 2.4-6.3 mm Hg in hypertensive patients. No significant effect was seen in diastolic pressure. Decreases in blood pressure were larger in trials of older hypertensive individuals.	Midgley JP, Matthew AG, Greenwood CM, Logan AG. Effect of reduced dietary sodium on blood pressure: a meta-analysis of randomized controlled trials. JAMA 1996;275:1590-7
A meta-analysis of seventeen trials in individuals with elevated blood pressure (n=734) was done. In individuals with elevated blood pressure the median reduction in 24-h urinary sodium excretion was 78 mmol (4.6 g/day of salt), the mean reduction in systolic blood pressure was -4.97 mmHg (95%CI:-5.76 to -4.18), and the mean reduction in diastolic blood pressure was -2.74 mmHg (95% CI:-3.22 to -2.26). The meta-analysis demonstrates a correlation between the magnitude of salt reduction and the magnitude of blood pressure reduction. Within the daily intake range of 3 to 12 g/day, the lower the salt intake achieved, the lower the blood pressure.	He FJ, MacGregor GA. Effect of longer-term modest salt reduction on blood pressure. Cochrane Database Syst Rev 2004;(1):CD004937
In the 33 trials lasting five weeks or longer the predicted reductions in individual trials closely matched a wide range of observed reductions. This applied for all age groups and for people with both high and normal levels of blood pressure. In people aged 50-59 years a reduction in daily sodium intake of 50	Law MR, Frost CD, Wald N J. By how much does dietary salt reduction lower blood pressure? III-Analysis of data from trials of salt reduction. Br

mmol (about 3 g of salt), attainable by moderate dietary salt reduction would, after a few weeks, lower systolic blood pressure by an average of 5 mm Hg, and by 7 mm Hg in those with high blood pressure (170 mm Hg); diastolic blood pressure would be lowered by about half as much. It is estimated that such a reduction in salt intake by a whole Western population would reduce the incidence of stroke by 22% and of ischaemic heart disease by 16%.	Med J 1991;302:819-24
A analysis of epidemiological studies reported that a difference in sodium intake of 100 mmol/24 h was associated with an average difference in systolic blood pressure that ranged from 5 mm Hg at age 15-19 years to 10 mm Hg at age 60-69. The differences in diastolic blood pressure were about half as great. The standard deviation of blood pressure increased with sodium intake implying that the association of blood pressure with sodium intake in individuals was related to the initial blood pressure--the higher the blood pressure the greater the expected reduction in blood pressure for the same reduction in sodium intake. For example, at age 60-69 the estimated systolic blood pressure reduction in response to a 100 mmol/24 h reduction in sodium intake was on average 10 mm Hg but varied from 6 mm Hg for those on the fifth blood pressure centile to 15 mm Hg for those on the 95th centile.	Law MR, Frost CD, Wald NJ. By how much does dietary salt reduction lower blood pressure? I-Analysis of observational data among populations. Br Med J 1991;302:811-5
Observational follow-up of 744 participants in TOHP I and 2382 in TOHP II who were randomised to a sodium reduction intervention or control. Net sodium reductions in the intervention groups were 44 mmol/24 h and 33 mmol/24 h, respectively. Vital status was obtained for all participants and follow-up information on morbidity was obtained from 2415 (77%), with 200 reporting a cardiovascular event. Risk of a cardiovascular event was 25% lower among those in the intervention group (relative risk 0.75, 95% confidence interval 0.57 to 0.99, P=0.04), adjusted for trial, clinic, age, race, and sex, and 30% lower after further adjustment for baseline sodium excretion and weight (0.70, 0.53 to 0.94), with similar results in each trial. In secondary analyses, 67 participants died (0.80, 0.51 to 1.26, P=0.34).	Cook NR, Cutler JA, Obarzanek E et al. Long term effects of dietary sodium reduction on cardiovascular disease outcomes: observational follow-up of the trials of hypertension prevention (TOHP). <i>BMJ</i> 2007;334:885
There is some evidence that the reduction of sodium intake improves the effect of ACEI, ARB-s, BB-s and reduces LVH.	MacGregor GA ym. Br Med J 1987;294:531-4 Navis G ym. Kidney Int 1987;31:815-9 Singer DR ym. Hypertension 1995;25:1042-4 Houlihan CA ym. Diabetes Care 2002;25:663-71 Owens CJ ym. South Med J 1978;71:43-6 Erwtman TM ym. Br Med J 1984;289:406-9 Parijs J ym. Am Heart J 1973;85:22-34 van Brummelen P ym. Acta Med Scand 1978;204:151-7 Ram CV ym. Arch Intern Med 1981;141:1015-9 Carney SL ym. Clin Exp Hypert 1984;A6:1095-105 Beard TC ym. Lancet 1982;2:455-8

	<p>Weinberger MH ym. JAMA 1988;259:2561-5 World Hypertension League. Bull WHO 1992;70:685-90 Jula AM ym. Circulation 1994;89:1023-31 MacMahon SW ym. N Engl J Med 1986;314:334-9 Hinderliter A ym. Arch Intern Med 2002;162:1333-9 Appel LJ. Hypertension. 2009;54:444-46.</p>
Economic analysis proves the cost-effectiveness of population level interventions of salt restriction in low and middle income countries.	<p>Asaria P, Chisholm D, Mathers C, Ezzati M, Beaglehole R. Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. Lancet 2007;370:2044-53.</p>

GRADE table based on:

He FJ, MacGregor GA. Effect of longer-term modest salt reduction on blood pressure. In: The Cochrane Library, Issue 4, 2007. Chichester, UK: John Wiley & Sons, Ltd. Search date 2005.

Sacks FM, Svetkey LP, Vollmer WM, et al. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. *N Engl J Med* 2001;344:3–10.

Number of studies (participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
20 (802)	Blood pressure	Salt reduction v normal intake	4	–1	+1	–1	0	Moderate	Quality point deducted for methodological flaws. Consistency point added for dose response. Directness point deducted for uncertainty of diagnostic measurement in study

Type of evidence: 4 = RCT; 2 = Observational; 1 = Non-analytical/expert opinion.

Consistency: similarity of results across studies.

Directness: generalisability of population or outcomes.

Effect size: based on relative risk or odds ratio.