Editorial

Hypertension: Time Always for Prevention via Dietary Salt Reduction

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Hypertension is defined as a systolic blood pressure (BP) of 140 mmHg or higher or a diastolic BP of 90 mmHg or higher.[1] However, health declines in persons whose blood pressure is above 115/75 mmHg. Hypertension is linked to an increased risk of stroke, myocardial infarction, heart failure, renal failure, and cognitive impairment.[1,2] Globally, a systolic BP above 115 mmHg is the top determinant of the risk of death,[1] and the absolute number of annual cardiovascular deaths approaches 8 millons.[2]

The restricted intake of sodium chloride (table salt) in heart failure is an old and effective treatment, whose success depends on limiting volume expansion of the circulating plasma (due to retention of sodium-linked free water). Dietary restriction of sodium (2 to 3 grams daily) is recommended in most patients with heart failure (HF); further restriction to <2 grams daily may be considered in severe HF. Fluid restriction to <2 litres/day is considered in hyponatremic patients (plasma sodium <130 mmol/L) and in those with hard-to-regulate fluid retention.[3]

Sodium is also a powerful pressor substance, and a widely available hypertensive agent. However, the idea that cutting the dietary intake of sodium, both table salt and the monosodium glutamate which underpins the new 'umami taste,' effectively decreases the blood pressure only took hold after a long lag-time.[4,5]

The dietary prevention of hypertension is attractive, yet notoriously difficult to translate into effective public health strategy.[6] There is no doubt that salt restriction will lower the BP by a small but effective amount, about 4/2 mmHg, in the long term.[4-6] A greater BP reduction (about 7/3 mmHg) occurs when the non-drug regime includes loss of body mass, and reductions in the intake of total calories, and of fats and sugars.[7] The so-called 'healthful dietary pattern' shown to lower the BP comprises less salt, and more fruits, vegetables, whole grains, low-fat dairy products, fish, nuts, and unsaturated vegetable oils.[6,8] The mean BP falls further still when these reductions are enhanced by regular aerobic exercise.[9] Obviously the whole 'lifestyle package' is best — it lowers the BP as much as one antihypertensive drug.[1]

However, in contrast to physical exercise, cutting salt is a change many people can sustain in the long term. What is the evidence that dietary salt restriction is effective in preventing cardiovascular disorders such as hypertension? The frequency curve of population disease outcomes (vertical axis) is plotted against BP (horizontal axis), which is a continuous variable. Therefore, BP threshold values wholly distinguish between 'treatment' and 'prevention' benefits. Recent large studies show compellingly that cutting salt prevents cardiovascular disease and death by lowering the prevalence of hypertension.[4,8] Overall, the evidence implies that salt reduction would shift the entire curve slightly to the left, and potentially shrink the area-under-the-curve too.[10]

The potential benefits are both disease prevention, and cost savings. Computer modelling for American adults aged 35 to 84 years at risk for coronary heart disease and stroke shows that salt reduction of 1 gram/day can save costs. Reduction of 3 grams/day would save 194,000 to 392,000 quality-adjusted life-years (QALYs).[8] A scaled-down and living-cost adjusted estimate for Singapore yields potential savings of 3500 to 7000 QALYs, and $200 million to $500 million per year. The model needs real-world testing under Singapore conditions.

What impedes successful delivery in the community? First, why do ordinary citizens find it so hard to alter their lifestyles to prevent hypertension, whereas some other measures have worked well in Singapore — e.g. cigarette smoking fell from near 20% to 12% between 2000 and 2007. Cutting salt in our diet is simple, sustainable, and free of charge. Some psychosocial factors are probably at work: eating salt does not harm bystanders, unlike smoking. Also, hypertension causes no diagnostic symptoms, and its disease outcomes are not as visually shocking as those on cigarette packs. For ill-defined reasons stroke, myocardial infarction or renal failure are not viewed as catastrophes, unlike cancer. Denial probably plays a part. However, a crucial resistance factor is commercial pressure, for salt and monosodium glutamate are cheap taste enhancers.

There is evidence that, across the community, more people take regular exercise than a decade ago; however, the exercise-induced prevention or delay of cardiovascular disorders has not been systematically examined in

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Singapore. The author believes that, after correcting for the harms inflicted by unbalanced (high-fat, high salt, excess calorie) diets, and rising overweight and obesity,[11] cohort-based evidence of the cardiovascular benefits of exercise would be hard to elicit locally. Nonetheless, the BP lowering benefit accruing from salt restriction on top of exercise is at least additive,[4] and must be encouraged. While 3 in 5 adult Singaporeans claim they restrict salt,[12] the associated depressor effect is mixed with the effects of other lifestyle alterations. We need objective measures of reduction in salt below the questionnaire-estimated amount of 8 to 10 grams (3200 to 4000 mg of sodium) per day.

Many people misunderstand that only some persons should cut their salt intake, and that salt reduction is not needed for most people. Nothing is further from the truth. High blood pressure is a massive community burden. In Singapore about 1 in every 3 adults,[11] and 48% of those aged 60 to 69 years have hypertension.[12] For people who have lived 50 years, the lifetime risk that hypertension will develop is 90%, according to robust data from the USA.[13] Furthermore, children and young adults also gain from salt restriction. Salt reduction in children lowers the blood pressure,[14] and blood pressure is directly associated with the formation of fatty streaks and other early lesions of atherosclerosis, even in children. The latter is a potent argument for cutting salt for everyone, from birth onwards.

The food industry can and must be persuaded to cut the sodium content of foods and drinks to a level that produces significant benefit in the community without appreciable change in taste. Government agencies in Singapore have a history of ingenious, effective, and widely admired methods to nudge, without unacceptable commercial regulation, the population to do the right thing. Road usage, and alcohol and tobacco use are regulated via taxation. For many years, the Ministry of Health Singapore[15] has promoted the preventive benefits of salt reduction within a bundle of lifestyle alterations.

Even the Congress in the 'Land of the Free' has debated the taxation of certain high-fat and high-salt foods deemed harmful to human health by the pertinent branches of the US National Institutes of Health, and the Food and Drugs Administration. Governments such as those in Britain and Germany are also implementing similar restrictions, stepwise, for the cardiovascular and general wellbeing of their peoples. Few informed profession leaders would deny that the science is robust, the correct measures (salt restriction and exercise) are cost effective, and that the urgency for action is great.

We need the sociopolitical will and professional energy to formulate easily practicable guides for doctors, allied professionals, and for people in the street. The way to go is down the 'iPhone apps' route. If only we could make the knowledge of salt reduction and BP self monitoring 'go viral' — now.

These correctable deficiencies in our lifestyle habits, and the real future benefits of appropriate action, are too important for the health, welfare and happiness of the community to be ignored further. Always, beyond 'World Hypertension Day', the message to our citizens must be: 'Take more exercise, eat less salt (and less food)'.

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