

Sugar and salt: a recipe for problems

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Reducing dietary salt intake is beneficial for most people, and especially for those who have diabetes. Guidance on adopting a low salt diet is provided here and in an accompanying patient handout.

For most people with diabetes, salt is not an issue; they are concerned about sugar, not salt. However, salt – or sodium chloride – can pose special problems for people who have diabetes because they have much higher rates of sodium-related medical conditions and are more likely to be taking medications affecting sodium metabolism.

This article discusses sodium-related problems associated with diabetes and identifies some strategies to address them.

Sodium-related medical conditions

Several medical conditions are associated with a high intake of sodium (Table 1). These conditions are commonly found in people who have diabetes.

Hypertension

About 60% of people with type 2 diabetes have high blood pressure. Excess sodium increases blood pressure, particularly in those with renal impairment. High blood pressure and diabetes cause 'double trouble' for cardiovascular disease.

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Oedema

Peripheral neuropathy causes shunting of arterial blood and increases venular and capillary pressure. This is a particular problem in the feet and lower legs where neuropathy is worse and the forces of gravity are highest. It is, therefore, no surprise that people with diabetes often have oedema. Excess salt makes this worse.

Heart failure

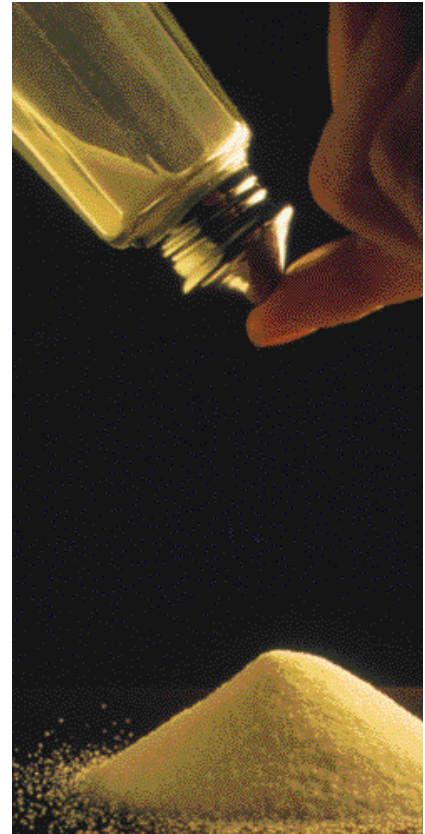
Whether ischaemic or cardiomyopathic, heart failure is common in people who have diabetes. By day gravity increases central venous pressure, increasing capillary pressure and filtration of fluid from capillaries into interstitial spaces, causing peripheral oedema. At night, when the influence of gravity is much less and excess peripheral fluid is absorbed into the general circulation, pulmonary oedema can occur. Salt makes the oedema worse.

Medications and sodium metabolism

Three types of medication are especially important in relation to salt: diuretics, NSAIDs and glitazones (Table 2).¹ They are all commonly used by people with diabetes.

Diuretics

A high sodium intake reduces the effectiveness of diuretics in the treatment of



PHOTOLIBRARY

Table 1. Sodium-related medical conditions

Hypertension

- High salt intake can raise blood pressure
- Associated with metabolic syndrome, diabetes and CVD, and with ageing

Oedema

- High salt intake can worsen oedema
- Associated with hypertension, cardiac failure and neuropathy

Cardiac failure

- High salt intake worsens peripheral and pulmonary oedema
- Associated with higher incidence of coronary heart disease, and with diabetic cardiomyopathy

hypertension, heart failure or oedema. If the person skips the salt, they may be able to skip the diuretic as well.

NSAIDs

NSAIDs are potentially dangerous drugs for people with diabetes. In addition to causing gastritis and potentially increasing cardiovascular risk, they also increase renal sodium retention and can damage the kidney directly. As NSAIDs are available over the counter as well as on prescription, and some are also contained in preparations such as cold and flu tablets, GPs may not even realise that their patients are taking them. Patients should be asked whether they are taking any medications for arthritis, pain or colds.

Arthritis Australia (www.arthritisaustralia.com.au; Australia-wide contact number 1800 011 041) has useful guidelines to control discomfort without using NSAIDs. Some alternatives to NSAIDs for arthritis and pain management are listed in Table 3.

Glitazones

Glitazones are very effective in controlling blood glucose but may result in fluid retention, especially in combination with insulin, which is itself salt-retaining. Those patients taking glitazones who are having problems with peripheral or pulmonary oedema may benefit considerably by avoiding salt in their diet.

Recommended daily intake of salt/sodium

'I don't get much salt. I don't add much salt in cooking or at the table. Anyway we need salt, especially in hot, humid climates like in Australia.'

This is a common response. It is both right and wrong.

- It is wrong in that we do get much more sodium than we need. The recommended adequate intake of sodium is 460 to 920 mg/day (20 to 40 mmol/day) and the recommended upper limit is 1600 mg/day

Table 2. Medications and sodium metabolism

Diuretics

- Effectiveness of diuretics in reducing body sodium (as in treatment of hypertension, cardiac failure, oedema) reduced by high sodium intake

NSAIDs

- NSAIDs increase renal sodium retention
- Associated with overweight and ageing

Glitazones

- Possible glitazone side effect of oedema reduced by lower/no salt intake

(70 mmol/day) for older, overweight and hypertensive patients and for those wishing to maintain low blood pressure over the lifespan.² The average Australian consumes up to 4600 mg sodium/day (200 mmol/day) – i.e. five to 10 times the recommended amount.³ See the box on this page for more on milligrams and millimoles.

- It is right in that we only add 15% of the total sodium in our food during cooking or at the table. Most (75%) of the sodium in our diet comes from processed foods (mainly added salt but also other sodium-containing ingredients such as monosodium glutamate, baking powder and sodium bicarbonate). About 10% of our sodium intake is naturally present in fruit, vegetables and meat.
- It is wrong in that for almost all Australians, food provides much more sodium than we need. Most of us do not spend our lives working vigorously in tropical heat, and even if we did, we would still get enough sodium from our food. The Australian Army stopped using salt tablets for

Table 3. Alternatives to NSAIDs for arthritis and pain management

Non-medication strategies

- Exercise (low impact, such as walking, cycling, swimming) – to maintain mobility and general fitness
- Resistance training – strengthens muscle groups around joints
- Alternative therapies – acupuncture, homoeopathy, massage*

Medication strategies

- Low risk analgesics – such as paracetamol in adequate doses[†]
- Topical analgesics – such as NSAID gels, especially for superficial discomfort

* There are no rigorous placebo-controlled trials for these therapies but they may work.

† Slow release forms of paracetamol are available on the PBS. Also, patients should be aware that paracetamol may be a constituent of preparations such as cold and flu tablets.

What's in a name? Milligrams and millimoles

The different conventions used for referring to sodium and salt can be confusing. Laboratories refer to millimoles (mmol) of sodium, recipes refer to teaspoons or grams of salt (sodium chloride), and food labels refer to milligrams of sodium.

Millimole and milligram equivalents can be calculated. When considering an element, 1 mole is the element's atomic mass in grams, i.e. for sodium, atomic mass 23, 1 mole is 23 g. When considering a compound, 1 mole is the compound's molecular mass in grams, i.e. for sodium chloride, molecular mass 58.5, 1 mole is 58.5 g. Therefore for sodium, 1 mmol is 23 mg, and for salt, 1 mmol is 58.5 mg.

Table 4. Hints on reducing dietary salt intake

- Avoid adding salt to food while cooking
- Avoid putting the saltshaker on the table
- Use fresh or dried herbs, spices, lemon or citrus juice, wine, mustard or vinegar to flavour food instead of salt or salty sauces
- Choose 'no added salt', 'low salt' or 'salt reduced' versions of products such as margarines, tinned baked beans and stock powders
- To retain the flavour of vegetables, cook them by steaming, microwaving or baking instead of boiling
- Replace salty snacks such as crisps, corn chips and pretzels with low salt crispbreads, fresh fruit and vegetable sticks

combat troops in tropical climates long ago.

Reducing salt intake

Most people, and especially those with diabetes, could benefit from reducing their salt intake. Some hints on how to do this are given in Table 4 and in the patient handout on page 65 and 66 of this issue of *Medicine Today*. Several consumer resources are listed in the box on page 63.

People often complain that low salt foods taste awful. As we reduce our salt intake our taste buds adapt to lower sodium levels, the perceived intensity of salt in food increases and the 'preferred saltiness' of food reduces. This taste change is usually noticed within a week of reducing the salt intake.²

Seeking salt – read the label

Having decided to reduce their salt intake, most people can think of ways to use less salt in food preparation and at the table. This is a good start but does not address processed food, the main source of salt.

Salt and food labels

Salt is listed on the nutrition panel of packaged food labels as sodium. Although most of the sodium in the diet comes from salt, which is used for both flavour and preservation in many processed foods, some comes from other sodium-containing ingredients such as monosodium glutamate (MSG), meat and vegetable extracts, stock cubes, baking powder and sodium bicarbonate. These hidden sources of sodium should be looked for on the ingredients list on packaged foods.

Foods that have a sodium content listed on the nutrition panel of 120 mg or less per 100 g of the food are an excellent choice in terms of sodium content; foods with 400 mg or less sodium per 100 g are a good choice. Other nutrients, such as saturated fat and fibre, should also be considered when making a food choice. An example of a nutrition information panel is given below – the food in this case is a particular brand of cracker biscuit that has a high sodium content.

Nutrition information panel

Servings per package: 33

Serving size: 30 g

	Quantity per serving	Quantity per 100 g
Energy	570 kJ	1630 kJ
Protein	4.7 g	13.5 g
Fat		
– total	0.6 g	1.7 g
– saturated	0.1 g	0.3 g
Carbohydrate		
– total	26.4 g	75.5 g
– sugars	0.3 g	0.9 g
Dietary fibre	2.2 g	6.3 g
Sodium	371 mg	1060 mg

The widespread use of salt in the food industry is related to its cheap price and its sensory and preservative properties. Fortunately food manufacturers are now obliged to include sodium contents in the nutrition information panels on food labels (see the box on this page). People should read these panels to check the sodium content of the food. Foods with sodium contents of 400 mg or less per 100 g of the food are a good choice in terms of sodium content, and those with less than 120 mg per 100 g an excellent choice.⁴

Lower salt versions of some popular products are available. Foods labelled

'low salt' must contain 120 mg or less of sodium per 100 g. 'Reduced salt' or '20% less salt' labels do not necessarily mean that the product is a healthy choice as the food may still have a sodium content above that recommended for a 'good choice' and/or may be high in total and saturated fat and added sugar.

Choosing processed foods with low or lower sodium contents is essential when trying to reduce sodium intake but may not be enough. Processed foods can have very high sodium contents and in some cases truly low sodium versions may not be available. Much of the salt intake of the

Table 5. Sodium content of various breakfast cereals

Cereal	Sodium (mg per 100 g)
Bran, oat/rice/wheat	0
Freedom Foods Corn Flakes with Psyllium	109
Freedom Foods Rice Flakes with Psyllium	110
Kellogg's All-Bran	380
Kellogg's All-Bran Wheat Flakes	330
Kellogg's Corn Flakes	720
Kellogg's Guardian	215
Kellogg's Just Right Original	30
Kellogg's Mini-Wheats	10
Kellogg's Nutri-Grain	600
Kellogg's Special K	536
Kellogg's Sustain	97
Muesli, average	133
Porridge/ rolled oats	10
Sanitarium Light 'n' Tasty Apricot	240
Sanitarium Lite-Bix	20
Sanitarium Weet-Bix Kids	110
Sanitarium Weet-Bix Multigrain	367
Sanitarium Weet-Bix Original	290
Uncle Tobys Plus Bran	395
Uncle Tobys Plus Fibre	105
Uncle Tobys Plus Sultanas'n Bran	385
Uncle Tobys Vita Brits	400
Uncle Tobys Vita Weeties	405

Australian population comes from 'recommended' foods such as bread, cereals and cheese. Most commercially available breads have a sodium content of more than 400 mg (about 17 mmol) per 100 g (which is about 120 mg or about 5 mmol sodium per slice). It is virtually impossible to purchase a low salt bread from an ordinary supermarket or bakery; it can usually only be found in specialty stores. People should be encouraged to use fresh unprocessed foods and to prepare their own low salt bread, soups, savouries and

saucers. Low salt breakfast cereals are also difficult to find, with some popular cereals containing more salt per serve than potato chips. Examples of cereals with sodium contents below 30 mg per 100 g include oats, Sanitarium Lite-Bix, Kellogg's Mini-Wheats and Kellogg's Just Right (Table 5). Most types of muesli are also low in salt.

If there is concern about a patient's adherence to a low sodium diet, a 24- or 48-hour urine output collection may be considered to check sodium turnover.

Several consumer resources of use

Consumer resources

Useful websites

- www.saltmatters.org – for shopping lists, cookbooks and the Salt Skip Newsletter
- www.nutritionaustralia.org/Food_Facts/FAQ/salt_faq.asp

A useful book

Salt matters: a consumer guide, by Dr Trevor C Beard, Lothian Books, Melbourne; 2004.

when shopping and cooking for low salt diets are listed in the box on this page.

Salt substitutes

There are several salt substitutes on the market, such as No Salt and Lite Salt. Most of these still contain sodium, and are not recommended. Other commercially available salts are just sodium chloride in disguise, such as rock salt and sea salt, or salt mixed with other ingredients, such as onion salt, celery salt, garlic salt and ordinary stock powders and cubes.

Potassium chloride salt substitutes contain almost no sodium but should be avoided in patients with renal dysfunction, or in those who are taking potassium-sparing diuretics.

Managing oedema – salt and stockings

Often people are taking diuretics because they have peripheral oedema. Skipping salt will help but support stockings are often very useful too.

As mentioned earlier, extracellular fluid accumulates in the areas where the pressure is highest – the feet, ankles and lower legs. Diuretics are often prescribed to 'squeeze' the excess salt and fluid out of the body. However, if the problem occurs because of lower limb venous hydrostatic pressure associated with gravity, reducing the total extracellular fluid volume will

not solve the problem. What is needed is to stop fluid in the high pressure areas from leaking into the extracellular space. Support stockings do this.

Encourage patients to put the stockings on before they stand up in the morning. If they wait until later, some oedema may have accumulated, making their legs thicker and the stockings more difficult to put on. If the patient has problems putting on the stockings, another person may be able to help. Also, there are various devices and techniques to make stockings easier to put on. Community nurses are often good sources of advice for 'tricks of the trade'.

Key points

- Excess sodium intake can pose particular problems for people with diabetes because they are at high risk of hypertension, oedema and heart failure compared with people who do not have the condition.
- Diuretics, NSAIDS and glitazones are

three medications commonly used in diabetes. A high salt intake may reduce the effectiveness of diuretics or further contribute to fluid retention resulting from NSAIDs or glitazones.

- The recommended adequate adult intake for sodium is 460 to 920 mg per day. The average Australian consumes up to five to 10 times the adequate amount (75% from processed foods, 15% added at the table and 10% naturally in foods).
- People should be encouraged to use fresh foods where possible, to check the nutrition information labels of processed foods for sodium and to look for 'no added salt', 'reduced salt' and 'low salt' foods.
- A gradual reduction in salt use allows taste buds to adapt.
- Many salt substitutes still contain some sodium. Potassium chloride substitutes should be avoided in patients with renal dysfunction and in those taking

potassium-sparing diuretics.

- Support stockings are a useful way of improving peripheral oedema. **MT**

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