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Sodium reduction in New Zealand requires major behaviour change

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ABSTRACT

This pilot study examined the feasibility of adherence to a low sodium diet in a sample of healthy New Zealand adults. It also addressed whether following a low sodium diet was accompanied by changes in intakes of other nutrients that influence cardiovascular risk. Eleven healthy adults provided dietary intake data and a 24-hour urine collection at baseline and follow-up. They then received nutritional counselling based on the World Health Organization recommendation for sodium intake (<2000 mg/day) and received ongoing nutritional support while undertaking a low sodium diet for four weeks. At the end of the four-week period, participants completed a semi-structured interview that elicited participants' opinions on barriers and facilitators to following a low sodium diet and explored changes in participants' dietary habits and behaviours. Thematic analysis revealed that adherence to a low sodium diet required substantial changes to participants' usual food purchasing and preparation habits. Participants reported that lack of control over the sodium content of meals eaten away from the home, the complex and time-consuming nature of interpreting nutrition information labels, and difficulty identifying suitable snacks were barriers to adherence. Detailed meal planning and cooking from scratch, using flavour replacements, reading food labels to identify low sodium foods, receiving support from other people and receiving tailored nutrition advice were facilitators. Mean sodium intake reduced over the period, accompanied by a decrease in mean intake of total fat. These factors suggest that sodium reduction in New Zealand adults was feasible. However, considerable changes to eating behaviours were required.

1. Introduction

Improving diet quality is a key component of prevention and treatment of non-communicable diseases (NCDs) (Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases, 2003; World Cancer Research Fund/American Institute for Cancer Research, 2007), which accounted for 68% of global deaths in 2012 (WHO, 2014). In order to reduce the burden of disability, morbidity and mortality due to NCDs, the World Health Organization (WHO) Global Action for the Prevention and Control of NCDs 2013–2020 has outlined nine voluntary global targets for Member States (WHO, 2013). These include the target of a 30% relative reduction in mean population sodium intake by 2025, which could help reduce blood pressure and associated risk of cardiovascular disease (WHO, 2012). Furthermore, WHO recommends that adults consume no more than 2000 mg of sodium (equivalent to 5 g salt) per day (WHO, 2012). However, actual sodium intakes worldwide far exceed this WHO recommendation. Recent estimates showed that adults worldwide consume an average 4000 mg/day, twice the WHO recommendation (Mozaffarian et al., 2014). In New Zealand, estimated sodium intakes of adults are approximately 3500 mg/day (McLean, Williams, Mann, & Parnell, 2011; Skeaff, McLean, Mann, & Williams, 2013).

Around 90% of dietary sodium is consumed as sodium chloride, or salt. Dietary sodium reduction is difficult because sodium is ubiquitous in the food supply (Cobb, Appel, & Anderson, 2012). In Western-style diets, approximately 75–80% of dietary sodium derives from processed food and only 10–15% of intake is added by the consumer while cooking or at the table (Mattes & Donnelly, 1991). In populations following Western-style diets in which there is a high reliance on processed food and eating out, reformulation of food to contain less sodium is essential if countries are to achieve a 30% reduction in sodium intake (He, Brinsden, & MacGregor, 2014). The UK salt reduction programme, which

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resulted in an estimated 15% reduction in population salt intake between 2003 and 2011, was based on a model which outlined that a 40% reduction in intake from processed foods and from salt added in the home was required in order to reach target levels (He, Pombo-Rodrigues, & MacGregor, 2014). The salt reduction programme had two arms: reformulation and changing consumer behaviour. Reformulation was driven by the setting of sodium concentration targets across a wide range of processed foods, while a consumer education programme focussed on encouraging consumers to add less discretionary salt and to identify and choose low salt products when purchasing food (He & MacGregor, 2009).

In New Zealand, voluntary reformulation of some processed foods such as bread, processed meat and breakfast cereals has been undertaken (Heart Foundation, 2015). However, the New Zealand government has no plans to set sodium concentration targets across a wider range of processed foods. Instead, a greater sodium reduction from individual behaviour change is needed to achieve recommended dietary intake targets. Dietary behaviour change at the consumer or individual level is challenging as it requires people to relearn habitual behaviours (Kumanyika, 1991). Furthermore, food choice is influenced by a complexity of individual and environmental factors that can hinder individual efforts to change dietary practices (Institute of Medicine, 2010). Providing guidance on the avoidance of obviously salty foods is one behavioural approach to reduce sodium intake from processed foods, but may be ineffective because high sodium levels are found in a variety of staple foods that are not obviously high in salt, such as bread, cakes, sauces and dressings (Ministry of Agriculture and Forestry, 2011; Thomson, 2009). Food choices are influenced by sensory, emotional, social and practical factors that include taste, familiarity, cultural norms, emotional associations, cost and availability (Kumanyika, 1991). These may be automatic, unconscious reactions to external cues and may have a stronger influence than consumers' desire to reduce their sodium intake for long-ranging health concerns. The consumption of salted foods is therefore embedded in sociocultural and emotional values, which may be hard to change (Kumanyika, 1991). Furthermore, Kumanyika (1991) notes that a lack of observable physiological feedback in response to increasing or decreasing sodium intake makes it hard to measure if an individual's efforts at sodium reduction are successful. Successful behaviour change to achieve sodium reduction is not just about knowledge of what to do and a desire to make a change, but also requires a deeper understanding of the influences on food choice, and strategies to manage these (Kumanyika, 1991). Intensive interventions have been successful in helping individual consumers to lower their sodium intake, although individuals are prone to relapse without ongoing support (Hypertension Prevention Trial Research Group, 1990; Kumanyika, 1991; Kumanyika et al., 2004).

It is not known how feasible it is for New Zealand adults to reduce their sodium intake in accordance with the WHO recommendation in the current food environment. In order to inform public health policy in settings where individual-based approaches are preferred, it is important to understand how easy or difficult it is for individuals to reduce their sodium intake and what factors can help or hinder adherence to a low sodium diet. Furthermore, if a low sodium diet is recommended to reduce blood pressure and associated risk of cardiovascular disease, it is imperative to understand whether adherence to a low sodium diet is accompanied by other changes in dietary patterns that could affect cardiovascular health. These areas are currently underexplored in the literature. A number of studies have examined barriers and facilitators to adherence to reduced sodium diets in high risk population groups such as patients with established heart failure or hypertension (Arcand et al., 2005; Bentley, Jong, Moser, & Peden, 2005; Biddle et al., 2003; Chung et al., 2006; de Brito-Ashurst et al., 2011; Heo, Lennie, Moser, & Okoli, 2009; Lennie, Chung, & Moser, 2013; Neily et al., 2002; Sheahan & Fields, 2008; Vennegoor, 2009). There is general agreement among these studies that participants' capability to reduce their sodium intake was predominantly influenced by: nutrition knowledge and the ability to identify, select and prepare low sodium foods (Arcand et al., 2005; Bentley et al., 2005; Biddle et al., 2003; Chung et al., 2006; Heo et al., 2009; Lennie et al., 2013; Neily et al., 2002; Sheahan & Fields, 2008; Vennegoor, 2009); social support and reinforcement (Chung et al., 2006; Heo et al., 2009; Sheahan & Fields, 2008); the palatability and acceptability of low sodium foods (Biddle et al., 2003; Chung et al., 2006; Heo et al., 2009); and cultural influences affecting food choice (Chung et al., 2006; de Brito-Ashurst et al., 2011). However, it is likely that these patients with health conditions directly related to their intake of sodium are more motivated than the general population to follow a low sodium diet. The WHO recommendation for sodium reduction applies to healthy and non-healthy populations alike, yet little is known about the barriers and facilitators to sodium reduction in healthy adults. Furthermore, although some studies have measured dietary changes associated with reduced sodium diets, there is no overall consensus on the association between a low sodium diet and the intake of other nutrients. No studies have explicitly addressed the impact of a low sodium diet on other nutrients of concern for cardiovascular disease risk, such as saturated fat, energy, potassium and sugars (Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases, 2003; Te Morenga, Howatson, Jones, & Mann, 2014).

This pilot study aimed to investigate whether healthy adults can achieve and adhere to a diet that meets the WHO sodium recommendation over four weeks; identify the barriers and facilitators to adherence to a low sodium diet; and explore whether a low sodium diet is accompanied by changes in intakes of other nutrients that influence cardiovascular risk. Understanding the feasibility and implications of following a low sodium diet will inform future studies involving dietary sodium reduction interventions.

2. Methods

2.1. Study design

This mixed-methods pilot study involved a four-week intensive nutrition intervention focussed on dietary change in order to help participants achieve a low sodium diet while attending weekly clinics for advice and support. At the end of the four-week period, participants participated in a semi-structured interview to explore their experiences and perceived barriers and facilitators in relation to following a low sodium diet. Dietary information was collected at baseline and follow up in order to monitor adherence, and to inform counselling. The study was approved by the University of Otago Human Ethics Committee (reference 15/096) and was registered with the Australian New Zealand Clinical Trials Registry (reference ACTRN12615001050549). All participants gave written informed consent prior to taking part in the study.

2.2. Participants

The study took place in Dunedin, a city of 120,000 people (Statistics New Zealand, 2015a) in the South Island of New Zealand. Participants were recruited through word of mouth, social networks and flyers placed on campus at the University of Otago, Dunedin. Eligible participants were healthy adults aged 18–65 years and living in Dunedin for the duration of the study. Participants were excluded if they were already restricting their sodium intake or were estimated to be consuming less than 2000 mg daily,