Research Brief

A Brief Educational Intervention Increases Knowledge of the Sugar Content of Foods and Drinks but Does Not Decrease Intakes in Scottish Children Aged 10–12 Years

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ABSTRACT

Objective: To assess the effectiveness of an educational intervention to improve children's knowledge of the sugar content of food and beverages.

Methods: Cluster-randomized, controlled trial with 268 children (aged 10–12 years) from 14 primary schools in Aberdeen, Scotland. The intervention group received 2 interactive classroom sessions about sugar. A questionnaire to assess knowledge was completed at baseline and 4, 10, and 34 weeks post-intervention. Dietary intake was assessed by food frequency questionnaire at baseline and on weeks 10 and 34.

Results: After the intervention, the intervention group demonstrated greater knowledge of sugar than did the control group ($P < .001$), which was sustained at week 34 ($P < .001$). Dietary intakes of sugar did not change postintervention. Pre-intervention children underestimated the sugar content of fruit-based beverages.

Conclusions and Implications: Children's knowledge of sugar in food and beverages is limited but can be improved through a simple educational intervention. Further intervention would be needed to encourage a change in dietary intake.

Key Words: sugar, knowledge, children, cluster-randomized controlled trial (*J Nutr Educ Behav*. 2015;■:1-7.)

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INTRODUCTION

The health implications of poor dietary habits among children are increasingly evident with the high prevalence of obesity and diet-related ill health.[1] Of particular concern is the intake of non-milk extrinsic sugars (NMES) (equivalent to free sugars or added sugars). The current recommended population intake of NMES is < 10% of total energy intake[2] and the World Health Organization recently proposed that this be reduced to 5%.[3] Current intakes among children are 14.4%[4] in the United Kingdom (UK) and 16% in the US.[5]

High intakes of NMES are associated with incidence of dental caries[6] and there is increasing evidence to suggest high intakes of NMES, in particular from sugar-sweetened beverages (SSBs), are linked to excess weight gain.[7-9] It has been suggested that sufficient evidence exists to support limiting SSB intake to reduce the prevalence of obesity and associated comorbidities.[10] Sugar-sweetened beverages are a dominant source of NMES in children's diets[4] and there have been calls for controls on marketing of these products to children.[11] A public health challenge is to reduce intakes of food and beverages high in NMES, which are often appealing, palatable, and heavily marketed.[11]

Despite health concerns about high intakes of NMES, at the time of this study there had been few public health campaigns designed to raise awareness to try and reduce intake. To be effective, such campaigns would require people to understand the sources of NMES; yet, little is known about children's knowledge of NMES or their awareness of the sugar content of food and beverages in the UK. The objective of the study was to assess the effectiveness of an educational intervention to improve children's knowledge of the sugar content of food and beverages.

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METHODS

The study was a cluster-randomized, controlled trial conducted between January, 2009 and January, 2010. The University of Aberdeen's College of Life Sciences and Medicine Ethics Review Board granted ethical approval. All state-funded primary schools in Aberdeen City, UK, with a Year 7 (children aged 10–12 years) class with a minimum of 20 pupils were invited to participate. Information describing the study was sent out via the school to all eligible children (and their parent or guardian). Baseline questionnaires were given to the children to be completed at home and consent was taken as implicit on the return of completed questionnaires.

Intervention

The intervention group received 2 45-minute interactive educational sessions on NMES and the NMES content of food and beverages, which was illustrated using heaped teaspoons of sugar (1 teaspoon = 6 g sugar[12]). These sessions were delivered in the classroom by the lead author (TLG) during the school day. All children in the class participated, but data were collected only from those who consented to take part in the study. The first session focused on the difference between intrinsic and extrinsic sugars, the sugar content of food and beverages, and the importance of minimizing sugar intake for health. The second (7–10 days later) reinforced health messages about sugar and NMES, and described the importance of energy balance. An information booklet summarizing the sessions was taken home and shared with parents and guardians, and a large poster (59 × 84 cm) designed for the study showing the sugar content of 16 popular food and beverages was displayed in the classroom throughout the intervention period (34 weeks). The control group did not receive the intervention sessions or any supplementary materials during the intervention or follow-up period. These were offered to control schools after completion of the study.

Outcome Measurements

The researchers assessed knowledge of NMES at baseline and 4, 10, and 34 weeks later, using a 26-item questionnaire. The questionnaire was developed and pre-tested with 5 different groups of children aged 8–12 years (n = 146). Item discrimination (item-to-total score correlation) ranged from 0.23 to 0.72, which is above the recommended cutoff of 0.2[13] and the Cronbach alpha score (.72) indicating acceptable internal consistency.[14] The Flesh Kincaid grade level score was 5.9, which suggested suitable readability for children aged 10–12 years.[15]

Throughout the knowledge questionnaire the term *sugar* was used rather than NMES because during pre-testing of the questionnaire the authors identified that NMES was an unfamiliar term to the children. The food and beverage items used included a range of SSBs (carbonated beverages, diluted fruit concentrate), fruit-flavored beverages (sugar sweetened), pure fruit juice, smoothies, candy, cookies, and breakfast cereal. The NMES content of the items was based on food labels, to be consistent with information seen by children; however, these were checked against the equivalent items in a national nutrient composition database.[16]

The knowledge questionnaire (Supplementary Material) asked children to (1) estimate maximum recommended daily intake of NMES (in teaspoons [tsp]) for boys (10 tsp) and girls (8 tsp) aged 10–14 years (maximum score, 4); (2) arrange 2 sets of food and beverage items by sugar content (maximum score, 6); (3) estimate sugar content (in teaspoons) of 6 foods and beverages (maximum score, 12); (4) identify whether food and beverage items contain NMES (maximum score, 8); (5) identify the food or beverage highest in sugar from a list of 4 items (maximum score, 2); and (6) demonstrate awareness of the 5-A-Day (fruit and vegetable) public health message (maximum score, 1). For questions in which children were required to estimate the NMES content, 2 marks were given for a correct answer and 1 for a response ± 1 tsp of the correct answer.

At weeks 4, 10, and 34, the same structure was used in the knowledge questionnaire but food and beverage items were changed to an alternative item with equivalent sugar content (eg, cola to lemonade). The questionnaires were completed in class with the exception of week 34, when the questionnaire was mailed for completion at home because children had moved to secondary school.

Dietary intakes were assessed using the Scottish Collaborative Group Food Frequency Questionnaire (FFQ) (version C2),[17] which assesses the frequency of consumption of 140 food and beverage items over the past 2-3 months on an 8-point scale ranging from *rarely or never* to ≥ *7/d*. The FFQ was previously validated to assess NMES intake using 24-hour dietary recall and 4-day food diaries among children of this age.[18] The FFQ was completed at baseline and at weeks 10 and 34 by the parent or guardian, with input from the child to ensure that food consumed away from the home when the parent or guardian was not present was included. At week 10 dietary intakes from the previous 2 months were reported to prevent overlap with baseline results. Total energy and nutrient intakes were derived from composition data from the UK National Diet and Nutrition Survey nutrient databank.[16]

To characterize the sample, weight status was assessed using parent-reported child waist circumference (detailed instructions and a tape measure were provided). This method was chosen to minimize intrusion to the child and is supported by evidence that suggests it is a good measure of weight-related health status.[19] Socioeconomic deprivation was assessed using the 2009 Scottish Index of Multiple Deprivation (SIMD),[20] a score derived from area statistics based on the child's home postal code.

The researchers calculated the sample size for the study using Sampsize (version 1.0.2, HSRU, University of Aberdeen, Aberdeen, UK, 2004).[21] To detect a 2-point difference in knowledge score between control and intervention groups with an SD of the change of 3.0 (based on knowledge scores obtained during pre-testing of the questionnaire), 80% power, 5% significance level, and an intracluster correlation of 0.1, a minimum of 12 clusters (ie, schools) with a minimum of 15 pupils/cluster were required. Schools were allocated to control or intervention groups using minimization, a method similar to stratified randomization but suitable for smaller trials, ensuring minimal