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Cross-sectional survey of the amount of free sugars and calories in carbonated sugar-sweetened beverages on sale in the UK

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ABSTRACT

Objectives: To investigate the free sugars and calorie content of carbonated sugar-sweetened beverages (CSSB) available in the main UK supermarkets.

Study design: We carried out a cross-sectional survey in 2014 of 169 CSSB.

Methods: The free sugars (sugars g/100 mL) and calorie (kcal/100 mL) were collected from product packaging and nutrient information panels of CSSB available in 9 main UK supermarkets.

Results: The average free sugars content in CSSB was 30.1±10.7 g/330 mL, and 91% of CSSB would receive a 'red' (high) label for sugars per serving. There was a large variation in sugars content between different flavours of CSSB and within the same type of flavour ranging from 3.3 to 52.8 g/330 mL. On average, ginger beer (38.5±9.9 g/330 mL) contained the highest amounts of sugars and ginger ale (22.9±7.7 g/330 mL) contained the lowest. Cola flavour is the most popular flavour in the UK with an average free sugars content of 35.0±1.1 g/330 mL. On average, the supermarket own brand contained lower levels of sugars than branded products (27.9±10.6 vs 31.6±10.6 g/330 mL, p=0.02). The average calorie content in CSSB was 126.1±43.5 kcal/330 mL. Cola flavour had a calorie content of 143.5 ±5.2 kcal/330 mL. Among the 169 products surveyed, 55% exceeded the maximum daily recommendation for free sugars intake (30 g) per 330 mL.

Conclusions: Free sugars content of CSSB in the UK is high and is a major contributor to free sugars intake. There is a wide variation in the sugars content of CSSB and even within the same flavour of CSSB. These findings demonstrate that the amount of free sugars added to CSSB can be reduced without technical issues, and there is an urgent need to set incremental free sugars reduction targets. A reduction in sugars content and overall CSSB consumption will be very beneficial in reducing obesity, type 2 diabetes and dental caries.

Strengths and limitations of this study

- This paper for the first time investigates the sugars content of carbonated sugar-sweetened beverages (CSSB) available in the UK supermarkets.
- The free sugars content in CSSB was found to be high, and there was a large variation in sugars content between different flavours and within the same type of flavour. These findings demonstrate that the amount of free sugars added to CSSB could be reduced without technical issues and there is an urgent need to set incremental free sugars targets.
- The study was based on the sugars content data provided on CSSB packaging labels in store; hence we relied on the accuracy of the data provided on the label. Therefore, it is assumed that the manufacturers provided accurate and up to date information in line with European Union regulations.

INTRODUCTION

Obesity, type 2 diabetes and dental caries are all major public health problems in the UK. It is well recognised that excessive free sugars consumption is associated with these conditions.[1 2] Free sugars include all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and unsweetened fruit juices. Under this definition lactose (milk sugar) when naturally present in milk and milk products and sugars contained within the cellular structure of foods (particularly fruits and vegetables) are excluded.

In the UK, in 2014, 62% of adults were overweight or obese (65% of men and 58% of women).[3] For children (2–15-year olds), in England, 14% were obese, with ~15% overweight.[4] Being overweight or obese is a risk factor for many serious and chronic health problems, including type 2 diabetes, some cancers and coronary heart disease.[5] Free sugars are a major hidden source of calories, with little or no nutritional value and contribute to obesity.[6 7] Some studies suggest that the role of sugars, particularly in

sugar-sweetened soft drinks, in obesity might be key because it provides little feeling of satiation.[8 9]

Diabetes affects 6% of the UK population, 90% of whom have type 2 diabetes.[10] Type 2 diabetes leads to further complications such as heart disease, nerve damage (neuropathy), kidney damage (nephropathy), blindness and amputations. It is estimated that 24 000 people in the UK die early each year from diabetes-related complications.[11] Diabetes costs the National Healthcare Service (NHS) almost £8.8 billion in 2011, which is 10% of the NHS budget. There is evidence that excessive sugar consumption increases the risk of type 2 diabetes.[12–17] However, it is not yet clear whether sugar causes type 2 diabetes through a mechanism other than weight gain. Nevertheless, obesity has contributed to a huge increase in type 2 diabetes.

Tooth decay is one of the most common reasons for children to be hospitalised in England, with 46 520 admissions to hospital in 2013–2014.[18] A recent study in England found 12% of 3-year olds[19] and 28% of 5-year olds[20] had tooth decay. Adults tend to have higher incidence of caries (UK 31%)[21] because of cumulative effects over time. Also research shows that deprivation is strongly associated with a risk of developing dental caries[22] because of higher intake of foods and drinks high in free sugars.[23] It is estimated that poor dental health costs the NHS £3.4 billion a year.[24]

A systematic review commissioned by World Health Organisation (WHO) found that the incidence of caries is lower when sugar intake is <10% of total energy intake and that there may be additional benefit in limiting sugars to <5% to further minimise the risk of caries throughout life.[25–27]

Furthermore, sweetened foods and beverages may be more concerning to children's and adolescent's health, as data suggest that exposure to foods during early development can effect food choices and preferences that persist throughout life.[28]

In July 2015, the Scientific Advisory Committee on Nutrition (SACN) recommended average intake, across the UK population, of free sugars should not exceed 5% of total energy intake (19 g for children aged 4–6, 24 g for children aged 7–10 and 30 g for children aged ≥11 years and adults). This is in line with the WHO new guidelines on free sugars intake.[27] SACN advises that consumption of sugars-sweetened drinks should be minimised in children and adults.

Current average intakes of free sugars (expressed from non-milk extrinsic sugars in the National Diet and Nutrition Survey (NDNS)) exceed recommendations in all age groups. The average sugars intake was 59 g per day which is equivalent to 236 kcal and contributes to 12.1% of our energy intake, which exceeds the current recommendation (<5% of energy intake). Children have a higher sugars intake. The average sugars intake was 61 and 74 g per day in 4–10 and 11–18-year olds, respectively.[29] This is likely to be an underestimate of how much free sugars are consumed[30] because under-reporting is highly prevalent in these types of surveys.[31–34] Additionally, consumers are largely unaware of the amount of free sugars in products they regularly buy because only total sugars are labelled on product packaging in most countries with nutrition labelling.

Soft drinks are the main contributor of free sugars intake in children (4–10 years), teenagers (11–18 years) and the second main contributor in adults (18–64 years), contributing to 30%, 40% and 25% of free sugars intake, respectively.[29 35] Within soft drinks, carbonated sugar-sweetened beverages (CSSB) are an important contributor of free sugars intake. Carbonates were the largest single category of the soft drinks market in 2013 with a 45% market share of volume.[36] CSSB sales were 3965 million litres, with an average person consuming 63 L of CSSB per year.[36] However, very little work has been conducted looking at the free sugars content of CSSB in the UK. This research was carried out to evaluate the free sugars content listed on the labels of CSSB products sold in the UK, report the variability in sugars level and assess the free sugars content in relation to the UK's new daily recommendation for free sugars intake.

METHODS

Data collection

The data were collected from product packaging and nutrient information panels. The survey was designed as a comprehensive survey of all CSSB available in a snapshot in time, using one large outlet per each of the nine main supermarkets.

For each CSSB, the data collected included the company name, product name, pack weight, serving size, sugars and calories per 100 mL and sugars and calories per portion. All data were double-checked after entry, and a further 5% of entries were checked against the original source in a random selection of products.

Inclusion/exclusion criteria

Data were collected from each of the major UK supermarkets (Aldi, Asda, Lidl, Marks and Spencer, Morrisons, Sainsbury's, Tesco, The Co-operative and Waitrose) which all together hold 93.2% of the grocery market share.[37] We included supermarket own brand and branded CSSB. We excluded CSSB products with no added free sugars (labelled zero sugar/calories) or products without sugars and calories information labelled. Some brands sell the same formulation in different serving sizes. We only included an example of one formulation regardless of the different serving sizes.

Product categories

Products were categorised into the following types of flavours: cola, cream soda, dandelion and burdock, elderflower, ginger beer, ginger ale, flavoured cola, orange, lemonade and other. The data were also categorised separately into supermarket own brand and branded.

Standardised serving size

The serving size was standardised to 330 mL size can equivalent even though some products are sold or recommend a serving of 250–500 mL.

High, medium and low criteria for sugars content

The free sugars content was compared to the UK front of pack colour-coded labelling for drinks. Portion size criteria apply to portion/serving sizes >150 mL. Colour coding is based on the following front of pack colour-coded nutrition labelling criteria (sugars—red/high >13.5 g/portion or >11.25 g/100 mL, amber/medium >2.5 and ≤11.25/100 mL, green/low ≤2.5 g/100 mL).[38]

Statistical analysis

Independent samples t-test was used to compare the levels of sugars between supermarket own brand and branded products.

Data are reported as mean, SD, range as indicated. Significance in all tests carried out was deemed significant as being p<0.05. All data were analysed using SPSS.

RESULTS

A total of 169 CSSB products met the inclusion criteria and were included in our analysis.

Free sugars content

Figure 1 shows the free sugars content in different flavours of CSSB per 330 mL. The average free sugars content in CSSB was 30.1±10.7 g/330 mL, and 91% of CSSB would receive a 'red' (high) label for sugars per serving (>13.5 g/serving). There was a large variation in sugars content between different flavours of CSSB and within the same type of flavour ranging from 3.3 to 52.8 g/330 mL. On average, ginger beer (38.5±9.9 g/330 mL) contained the highest amounts of sugars and ginger ale (22.9±7.7 g/330 mL) contained the lowest amount of sugars. Cola flavour contained 35.0±1.1 g/330 mL of free sugars, ranging from 32.0 to 37.3 g/330 mL.

The supermarket own brand contained lower levels of sugars than branded products (27.9±10.6 vs 31.6±10.6 g/330 mL, p=0.02).

Calorie content

Table 1 shows the calorie content in different flavours of CSSB per 330 mL. The average calorie content in CSSB was 126.1±43.5 kcal/330 mL. There was a large variation in calorie content between different flavours and within the same type of flavour. On average, ginger beer (160.8 ±40.2 kcal/330 mL) contained the highest amounts of calories and ginger ale (96.9±30.6 kcal/330 mL) contained the lowest amount of calories. Cola flavour had an average calorie content of 143.5±5.2 kcal/330 mL.

The supermarket own brand contained fewer calories than branded products (117.7±44.2 vs 132.2±42.2 kcal/330 mL, p=0.03).

Comparing to the maximum daily recommendation for sugar intake

On average, a can (330 mL) of CSSB (30.1±10.7 g/330 mL) contains more than the entire maximum daily recommendation for free sugars intake in the UK (30 g).

Among the 169 products, 55% exceeded the maximum UK's daily recommendation for free sugars intake (30 g) per 330 mL can size. Additionally, 73% of the products exceeded the maximum daily recommendation for free sugars intake for a child (24 g).

DISCUSSION

The free sugars content in CSSB was found to be high, and there was a large variation in sugars content between different flavours and within the same type of flavour. Branded CSSB had a higher sugars content compared with supermarket own brand. The amount of free sugars in an average CSSB (30.1±10.7 g/330 mL) is more than the entire maximum daily recommendation for free sugars intake for an adult in the UK. It is therefore not possible to state that CSSB can be consumed as part of a 'healthy balanced diet' even though drinks companies claim it can be.

Cola flavour is the most popular flavour in the UK with an average free sugars content of 35.0±1.1 g/330 mL. Owing to the huge volume consumed, even small reductions would have a significant impact on free sugars and calorie intake of the population.

CSSB also contribute to sugar intake in many other countries around the world showing that high levels of sugars in CSSB is a global challenge.[39–42]

There is much evidence that free sugars in CSSB is an important contributor to obesity, type 2 diabetes and dental caries, contributing to huge healthcare costs.[43–45] There is therefore an urgent need to reduce the amount of free sugars in CSSB.

The free sugars content in CSSB and the population sugar consumption from CSSB can be reduced by various approaches, for example, mandatory front of pack labelling of free sugars, public education, portion size reductions, warning labels, taxation and reformulation. Reformulation is by far the most practical as demonstrated by the successful UK salt reduction programme.[46]

Since 2003–2004, the UK has undertaken a voluntary salt reduction programme initiated by Consensus Action on Salt and Health in collaboration with the Food Standards Agency and now the Department of Health.[46] The average salt intake (as measured by 24-hour urinary excretion) for adults fell from 9.5 g in 2000–2001 to 8.1 g in 2011 accompanied by a significant fall in population blood pressure and mortality from stroke and coronary heart disease.[47 48] The National Institute for Health and Care Excellence estimated that the reduction in salt intake prevented around 18 000 strokes and heart attacks, half of which would have been fatal and saved around £1.5 billion in healthcare costs per year.[49]

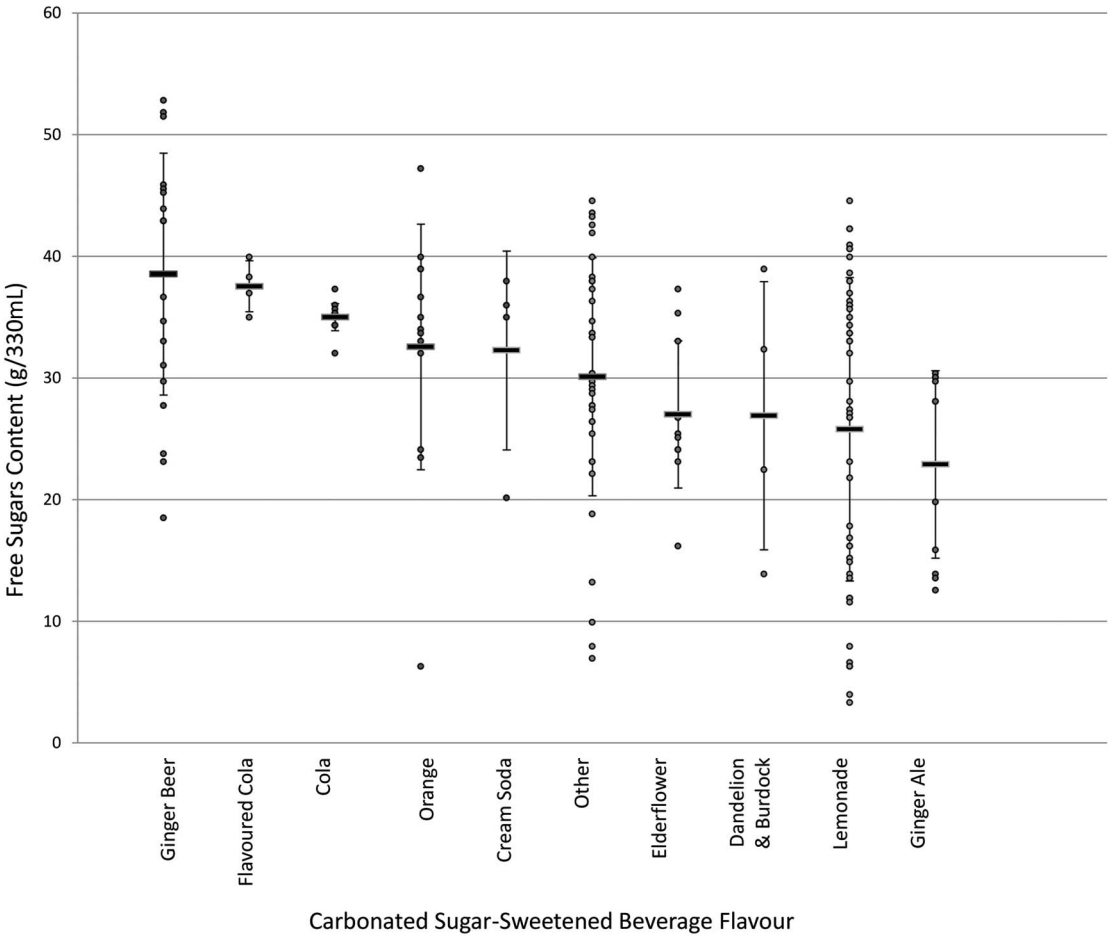

Figure 1 Free sugars content in different flavours of carbonated sugar-sweetened beverages (g/330 mL).

Table 1 Calorie and free sugars content in standardised serving size for each type of carbonated sugar-sweetened beverages flavour (g/330 mL)

Favour	N	Calorie (kcals) mean±SD	Free sugars (g) mean±SD	% of beverages with free sugars ≥the maximum daily recommendation for free sugars intake (30 g)
Ginger beer	21	160.8±40.2	38.5±9.9	81
Flavoured cola	4	152.9±8.6	37.5±2.1	100
Cola	16	143.5±5.2	35.0±1.1	100
Orange	13	136.3±39.5	32.5±10.1	77
Cream soda	4	131.6±31.9	32.3±8.2	75
Other	37	126.8±40.3	30.1±9.8	54
Elderflower	11	110.1±23.3	27.0±6.1	27
Dandelion and burdock	4	112.9±37.4	26.9±11.0	50
Lemonade	48	110.5±52.0	25.8±12.5	48
Ginger ale	11	96.9±30.6	22.9±7.7	36

The key to the success of the UK salt reduction programme is setting incremental targets for each food group with a specified timeframe to be achieved using maximum and average or sales-weighted average targets.[46] Since there has been a gradual, progressive reduction in salt, the UK population has adjusted to the taste of lower salt concentrations. There has been no loss of sales or switching between products as a result of salt reduction, or addition of salt at the table. As this policy targets all foods and does not rely on consumer behaviour change, it particularly benefits people from lower income households who consume more unhealthy diets than people in higher income households.[23]

Given the progress made with the salt reduction programme in the UK, it has been proposed by Action on Sugar that free sugars can be reduced through a similar systematic, unobtrusive and gradual reformulation programme for manufacturers.[50] This would be achieved by

setting progressive targets for each food and drink category, which would allow for an incremental reduction of free sugars and provide a level playing field to industry, which is vital for a voluntary policy. Importantly, there would be no substitution with non-caloric sweeteners, so that the taste receptors would adjust.

Free sugars have been claimed to be important in the flavour, texture and acceptability of CSSB.[51] Studies describing the reduction of sugars in CSSB are limited, despite the importance of this to public health. Products that exist involve using non-caloric sweeteners such as acesulfame K, aspartame, saccharin, sorbitol, sucralose, steviol glycosides (stevia plant extracts) and xylitol, which are all approved in the UK. However, the common practice in the UK has been to create new versions of CSSB with non-caloric sweeteners and not incrementally reducing the sugars content of the original CSSB. Even though this creates alternative products with no free sugars and lower in calories, it would not necessarily convert consumers of the CSSB to buy these alternatives.

Also the evidence now indicates that non-caloric sweeteners could be associated with increasing risk of the same chronic diseases linked to the consumption of sugars.[52] Furthermore, the use of non-caloric sweeteners may also be particularly concerning in children since consumption of hyper-sweetened foods and beverages at young ages may have effects on sweet preferences that persist into adulthood.[52]

Some supermarket own brand CSSB have been produced with lower sugars content which demonstrates that—despite claims to the contrary—delivering lower sugars products appears not to be a technical issue related to soft drinks manufacture. Corporate decisions about beverage composition are often based on factors such as common practice, taste and price, rather than health.

Our paper, using the example of one of the top contributors of sugars to the UK diet—CSSB, demonstrates that a national target-based approach to reformulation is urgently needed to incrementally reduce the sugars content in beverages.

LIMITATIONS

Our study was based on sugars and calorie content data provided on the available CSSB packaging labels in store on the dates of collection; hence we relied on the accuracy of the data provided on the label. Therefore, it is assumed that the manufacturers provide accurate and up to date information in line with European Union regulations. However, future studies should include free sugars and calorie content determined through laboratory analysis to achieve a better understanding of the true free sugars and calorie content and breakdown of free sugars composition. Nevertheless, the results of this study are relevant and serve to document the sugars content of CSSB products sold in UK supermarkets, providing a foundation for future studies and providing evidence for the sugar reduction programme and the soft drink industry to reformulate these products.

CONCLUSIONS

This research demonstrates that sugar content of CSSB in the UK is high, and there is a wide variation in the sugars content of CSSB and even within the same type of flavour. These findings demonstrate that the amount of free sugars added to CSSB can be reduced, and there is an urgent need to set incremental free sugars targets. Other measures are also needed to reduce overall consumption of CSSB, for example, mandatory front of pack labelling of free sugars, public education, portion size reductions, warning labels and taxation. A reduction in sugars content and overall CSSB consumption will be very beneficial in reducing obesity, type 2 diabetes and dental caries.

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Data sharing statement The sugar and calorie information of each product included will be available on http://www.actiononsugar.org.

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