



## Sugar – turning sour with rising obesity rates?

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Rates of obesity are rising here in New Zealand, and we are still looking for reasons why. After years of messages about fat being a major contributor, a large percentage of the population are now conscious of how much fat they eat, of the reputedly 'bad' saturated fats, and how these negatively affect their health. But still rates rise.

Recently, the spotlight has swung around to sugar – in fact there is a wave of consumers who see sugar as the new diet evil, responsible for not only obesity but diabetes and other health issues, and they are convinced it needs to be drummed out of their daily diet.

### Biochemistry of sugar digestion

To begin a discussion on sugar, we need to look at what happens when we consume carbohydrates, including sugar. Carbohydrates are digested in the small intestine where they are converted to their monosaccharide units; glucose, fructose and galactose. These are absorbed into the blood stream and travel to the liver, where they are converted into the basic unit of glucose. This glucose is then used by the body in three ways – transported to cells to be used as energy, stored in the liver and muscles as glycogen, or, if an excess amount is present, converted to fat and stored in adipose (fat) tissue stores.

The hormone, insulin, is produced by the pancreas when carbohydrates are eaten and is the key to cells receiving glucose from the blood stream. It therefore has a role in providing cells with energy while maintaining blood glucose levels. Eating more carbohydrate stimulates the production of more insulin.

### Sugars in our diet

We can take the view that there are two types of sugar in the food we eat – 'free' and 'intrinsic'.

Intrinsic sugars are those found naturally in the cellular makeup of foods such as fruit and vegetables. Free sugars can be added (by manufacturers, cooks, consumers), or are naturally in a food, such as honey and fruit.

The type of sugar we eat determines the body's blood glucose response. Intrinsic sugars take more time to be digested because the sugars are part of the cellular structure and other nutrients, such as

fibre, help slow digestion. The sugar from foods high in free sugars is more quickly absorbed as these foods may contain little in the way of other nutrients to slow digestion. Foods which are quickly digested have a high glycaemic index (GI), while those with longer digestion periods are classified as low GI.

### What about fructose?

Lately there have been questions about whether the monosaccharide, fructose is potentially more detrimental to health than other sugars. Much of this discussion is driven from the United States, where high-fructose corn syrup is used widely as a lower cost sweetener. It is not widely known among the general population that sucrose is a disaccharide of fructose and glucose, so foods sweetened with sucrose here in New Zealand contain similar amounts of fructose to those sweetened with high-fructose corn syrup. Fructose is metabolised differently in the body but to date there is little evidence that replacing fructose with glucose would provide benefits. On a positive note, New Zealanders eat less sugar per capita than the US population.

### Sugar consumption and type 2 diabetes

Many people believe eating excess sugar causes higher insulin levels and leads to diabetes. Type 2 diabetes is characterised by cells becoming resistant to the action of insulin, which means glucose cannot enter the cells and remains in the bloodstream, thus causing blood glucose levels to rise. Sugar by itself doesn't cause this insulin resistance. It is affected by excess body fat levels and inactivity. However, when too much sugar is eaten it will be stored as body fat, so may have an effect on diabetes through this indirect route.

### Sugar and poor health

Evidence associating sugar and poor health has, until recently, been contentious and local research published earlier this year once again had the nutrition community talking. A systematic review and meta-analysis of randomised controlled trials by the University of Otago concluded intake of free sugars or sugar-sweetened beverages is a determinant of body weight. Their study showed a reduction in ingestion

of free sugars was associated with a small but significant reduction in body weight, whilst an increase in sugar intake was associated with a comparable weight increase. These body weight variations seem to be due to changes in energy intakes, i.e. by reducing free sugar intake there was a corresponding reduction in kilojoules.

The study also looked at the intake of sugar-sweetened beverages in children. Those children with the highest intake were at an increased risk of being overweight or obese compared to those who had the lowest intake. The higher intake has the potential for an excess intake of energy in the form of sugar, where the glucose could be converted to fat and stored in the body, adding to weight gain.

## Recommendations for sugar intake

So if sugar intake were to be limited, what is a desirable amount? The American Heart Association (AHA) recommends a daily intake for added sugars of around nine teaspoons for men and six for women. Currently Americans eat and drink about 22 teaspoons of sugar a day which has increased steadily over the past three decades, with teens and men consuming the most added sugars. A teaspoon of sugar is reckoned to weigh 5g.

The 2008/9 Adult Nutrition Survey found the daily intake of total sugars (free plus intrinsic sugars) here in New Zealand was around 120g for men and 96g for females. These total sugars came from all food sources, with the major contributors being fruit (18%), non-alcoholic beverages (17%), sugar and sweets (15%) and milk (10%).

Obesity action groups have suggested policy initiatives, such as taxation on high sugar and high fat foods, as a means of reducing the calorific intake and dietary inequalities in the population. A more recent suggestion has been to introduce a tax on sugar-sweetened beverages. Modelling in research studies suggests this may be successful in reducing sugar consumption as these drinks are in a stand-alone category with limited consequences of alternatives being chosen, healthier alternatives being readily available (water, zero- and lower-sugar beverages) and the recent evidence that a high intake of these products is associated with higher risks of developing obesity and type 2 diabetes. The sugar consumption level of adults in New Zealand is 10% of energy, with all non-alcoholic beverages contributing 5% of energy intake.

On an individual level, consumers often focus on a single nutrient, not realising the importance of the range of foods eaten every day. There has been increasing interest in cutting sugars out of the diet, with headlines in the media on a regular basis. Totally excluding sugars from a diet is not needed, neither are large quantities of sugary foods and drinks. An emphasis on reducing free sugars in a diet and replacing with more nutrient dense foods may have beneficial effects in reducing both energy intake and the glycaemic index of foods consumed.

## Conclusion

In the context of obesity, it is timely to recall this is a multi-factorial problem which cannot be put at the door of a single nutrient. In the same journal article as the recent Otago research, a systematic review found reducing fat intake leads to lower body weight in adults and children. Sugar certainly needs to be considered as we search for strategies to address or prevent obesity in this country, as one of the strings in the obesity bow.

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