Free sugars and human health: Sufficient evidence for action?

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For at least a thousand years sugar has been valued for its organoleptic and preservative properties and as an important trading commodity. The report of a recent joint WHO/FAO Expert Consultation on diet, nutrition and the prevention of chronic diseases (1) has suggested that free sugars should be restricted to less than 10% total energy, providing further justification for a guideline to restrict sugar intake which is in place in more than 20 countries (2). Intensive lobbying from the US food industry threatens the adoption by the World Health Assembly (WHA) of WHO's Global Strategy on Diet, Physical Activity and Health which recommends reductions in fat, salt and sugar content of foods and increased physical activity. Industry objections appear to centre largely around the recommended intake of sugar and there are claims that the evidence is insufficient and that other authoritative reports do not reach comparable conclusions. On another tack, Oxfam has recently released a briefing paper describing the European Union's (EU) Common Agricultural Policy (CAP) relating to sugar which is allegedly devastating livelihoods in sugar producing countries in the developing world (www.oxfam.org.uk/what_we_do/issues/trade/bp27_sugar.htm). Substantial sugar subsidies have led the EU to become the largest exporter of white sugar, despite being one of the world's highest cost producers of sugar. Thus it is claimed that "social and economic havoc has been inflicted on farmers in some poor countries, who have not only seen their exports shut out by EU tariffs, but also face EU competition in third markets." So there can be little doubt that sugar is still of huge importance in the global economy and it is clearly

important to consider whether there is indeed sufficient evidence to recommend that intake be restricted.

The term sugar was previously understood to be more or less synonymous with sucrose derived from sugar cane or beet. In the United States and in other countries high fructose corn syrup is increasingly used in manufactured foods so that while intake of sucrose may be decreasing, the total amount of sugars is not. For example, in the United States estimated deliveries for domestic food and beverage use have changed as follows: from 1966 to 2002 refined sugar decreased from 97.3 to 63.2 pounds per capita, total caloric sweeteners increased from 112.9 to 146.1 pounds per capita in 2002, largely as a result of the increase in corn sweeteners (3). From the perspective of human health sugars are generally divided into two main groups: those incorporated within the structure of intact fruit and vegetables (sometimes labelled “intrinsic” sugars) and those saccharides which are added to foods and drinks by manufacturer, cook or consumer (added sugars). Dietary guidelines do not recommend restriction of intrinsic sugars or milk sugars (lactose, galactose) since these are not considered to have adverse health outcomes. However, added sugars plus concentrated sugars in honey, syrups and fruit juices (collectively described as “free sugars”) are believed to be broadly comparable when it comes to considering untoward effects and are therefore considered as a group.

Those critical of the recommendation regarding restriction of free sugars quote two recent reports which they claim do not support such a recommendation. One issued in September 2002 by the Institute of Medicine (IOM) on dietary reference intakes (4) has been

misrepresented as suggesting that added sugars may provide up to 25% total energy without detrimental effect. However this maximal intake level is based on ensuring adequacy of certain essential micronutrients and does not imply that this is an acceptable level of intake in other respects. An earlier FAO/WHO report (5) has also been cited as failing to confirm a link between intake of sugars and chronic disease. This1998 Report acknowledges that there may not to be a direct causal association between consumption of sugars and coronary heart disease, diabetes and other chronic diseases. However it recognises that sugars contribute to the energy density of the diet. If sugars contribute to the global epidemic of obesity, they do indeed contribute to its health consequences, including type 2 diabetes and coronary heart disease. The question then is whether free sugars contribute to obesity.

The belief that reduction of intake of free sugars may help to reduce obesity rates is based upon the substantial body of literature which suggests that human appetite control systems do not recognise energy dense foods and drinks and thus do not down regulate bulk of foods eaten to maintain energy balance. Regular consumption of such energy dense foods and drinks is believed to lead to passive overconsumption and weight gain. Reduction of such foods would thus be expected to lead to energy deficit and weight loss. The typical energy density of energy dense fast food is about 1000 kJ/100 g, and of the average British diet about 670 kJ/100 g. The recommended level is about 525 kJ/100 g. Much of the research considering the effect of energy density on energy balance relates to fat content of the diet (6). However several studies confirm that sugars have a similar effect.

More than 30 years ago Mann et al, examining the effects of different dietary carbohydrates on serum lipids, found that free living individuals followed for 5 months, showed a significant weight loss, when asked to substitute as far as possible usual daily intake of sugar with starchy foods. On the other hand those who were asked to halve their consumption of starchy foods and substitute other foods gained weight (7). The CARMEN study (Carbohydrate Ratio Management in European National diets) (8) was a multicentre, randomised trial that tested, in overweight individuals, the effects of altering the ratio of fat to carbohydrate, as well as the ratio of simple to complex carbohydrate per se. Reducing the relatively high fat intake (initially fat provided about 36% total energy [TE]) by about 10% TE was associated with a significant reduction in weight. Of particular relevance to the present discussion is the comparison between the two high carbohydrate diets, one high in simple carbohydrate and the other high in complex carbohydrate. Although difference in weight reduction on the two diets was not statistically significant, the reduction in body weight was twice as great on the high complex carbohydrate diet, which was higher in dietary fibre and less energy dense, than on the high simple carbohydrate diet. Furthermore, when considering individuals with the metabolic syndrome, weight loss was appreciably and significantly greater, -4.25 kg on average, on the high complex carbohydrate diet compared with the high simple carbohydrate diet, -0.28 kg (9). Brynes et al randomised free-living subjects to a high fat diet or to one of three diets intended to be isoenergetic and in which carbohydrates provided half total daily energy (10). One diet was high in low glycaemic index (GI) foods, one in high GI foods, and the third relatively high in sucrose (about 130 g/day). Body weight decreased on the low GI diet and increased on the other

three diets, the weight increase on the sucrose diet being nearly double that on the high fat and high GI diet and significantly higher than that observed on the low GI diet.

It seems possible that drinks that are rich in free sugars may be particularly important in promoting weight gain. Children with a high consumption of soft drinks rich in free sugars are more likely to be overweight and gain excess weight (11). A recent randomised trial found a higher energy intake and progressive increase in body weight when drinks and foods rich in free sugars rather than energy free artificially sweetened drinks and foods were consumed (12).

In addition to the effect on energy balance, several studies have examined the effects of sugars on metabolic indices. It is clearly difficult to disentangle independent effect of sugars on indices of lipid metabolism and insulin sensitivity from the effects of weight change on such measurements since there is unequivocal evidence that weight loss improves lipoprotein profile and reduces insulin levels (13). Nevertheless there is evidence that diets relatively low in sugars may be associated with lower levels of fasting and postprandial triglyceride and that this effect may at least in part be independent of the effect of weight loss (14). Analysis of the subgroup within the CARMEN study diagnosed as having the metabolic syndrome showed that changes in body weight and metabolic indices observed when replacing simple with complex carbohydrate may be more striking in individuals with this condition than in the general population (9).

Thus there is considerable evidence suggesting that sucrose and other free sugars contribute to the global epidemic of obesity. Reducing the intake of sugars may make a useful contribution along with other measures in reducing the risk of obesity and its clinical consequences. Suggesting an appropriate upper intake requires a judgement based on dietary and disease patterns, but has been guided by the association between free sugars and dental caries (2). The best available evidence suggests that the level of dental caries is low in countries where the consumption of free sugars is below 15-20 kg/person/year. This is equivalent to 40-55 g/person/day or 6-10% total energy. As there is evidence that frequency of consumption contributes to dental caries there would seem to be justification for a guideline concerning intake of sugars to refer to both quantity and frequency of intake. South Africa has recently joined the ranks of the countries in which advice regarding sugar intake is included amongst the dietary guidelines (2). Countries which have not yet included recommendations concerning sugar intake might well consider an approach comparable with that taken by the South Africans: “Consume food and drinks containing sugar sparingly and not between meals”(2).

It would be helpful if the Institute of Medicine could modify the text of its report before final publication, to eliminate further misinterpretation of its recommendations regarding sugars. It might also be valuable if FAO were to convene a further Expert Committee to help clarify possible ambiguities in its 1998 Report. It is imperative for policy makers in governments and other organisations (e.g. heart foundations, diabetes organisations) to have unequivocal authoritative statements on which to base guidelines. With regard to sugars, WHO has led the way with its updated technical report relating “Diet, Nutrition and

the Prevention of Chronic Diseases". The implementation of these important public health measures by Governments and Non-Governmental Organisations would be facilitated by a firm endorsement by the WHA of the Global Strategy. It is to be hoped that health professional and researchers in member states will act to ensure their governments' support of the Global Strategy and that the interests of public health will override the vested interests of some food industries. Is it too much to ask that when considering the health implications of excessive sucrose intakes the social implications of the EU's CAP, as it relates to sugar, is also considered?

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