



irish dental association

Food, diet and oral health

A specially convened Association group has produced a policy paper on 'Food, diet and oral health'. Chaired by Dr Michael Crowe, the group included Drs Donal Blackwell, Michaela Dalton and Ed O'Reilly, and Chief Executive Fintan Hourihan. The *Journal* brings you both the policy position and the scientific basis for that position.



Dental caries is a preventable disease, yet it is still a major health problem in most western countries. In Ireland, half of all 12 year olds and three-quarters of all 15 year olds have had decay in their permanent teeth.¹ While the causes of dental caries are multi-factorial, there is overwhelming evidence that sugars in food and beverages are the main dietary cause of caries in children and adults.²⁻⁵ The consequences can include pain, infection, absenteeism and an impact on self-esteem. For children there can also be a negative effect on the permanent dentition, growth and development, and specialist or hospital treatment may be required.

Oral health is vital to overall general health, and chronic diseases such as obesity, cardiovascular disease, diabetes and dental caries have common risk factors. As a diet high in sugary, energy-dense foods is a common aetiological factor for some chronic diseases, a common risk factor approach in their prevention has been suggested by the WHO.⁶

Irish Dental Association's position

The Association:

- supports measures aimed at promoting a healthy lifestyle, especially those concerned with encouraging healthy eating habits based on the food pyramid, increasing physical activity and improving access to oral healthcare;
- particularly supports any measures that result in a reduction in the frequency of consumption of sugary foods and drinks, which are the most important dietary cause of dental caries and dental erosion. These measures should also be directed towards increasing public awareness of the oral and general health risks associated with excessive frequency of consumption of dietary sugar, clearer labelling of foods and appropriate marketing of high energy/sugary foods and drinks;

- calls on all healthcare providers and interested parties, including Government, parents, schools, the food industry, the FSAI and the HSE to co-operate and foster relationships aimed at improving the oral and related general health of the population;
- encourages all members to support this position in their efforts to communicate with the public and while providing oral health education for their patients;
- feels that branches should support the continuing education of members by providing regular scientific updates on diet and oral and general health; and,
- encourages all members to promote public awareness of the link between diet, oral health and general health.

References

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2. Gustafsson, B.E., Quensel, C.E., Lanke, L.S., Lundquist, C., Grahnen, H., Bonow, B.E., *et al.* The Vipeholm dental caries study. The effect of different levels of carbohydrate intake on caries activity in 436 individuals observed for five years. *Acta Odontol Scand* 1954; 11: 232-364.
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6. Peterson, P.E., *et al.* The global burden of oral diseases and risks to oral health. *Bull World Health Organ* 2005; 83: 9.

Scientific basis for opinion

This technical support paper was prepared for the Association by Professor Mike Gibney, Head of Nutrition, UCD Institute of Food and Health.

Issue 1: Frequency of intake versus the percentage of energy from added sugars

The definitive evidence that frequency of consumption of cariogenic foods could influence dental caries came from intervention studies¹ in institutionalised children in Scandinavia. The cut-off point above which caries would most likely develop from frequency of sugar consumption was four occasions per day of cariogenic foods. Translating the frequency of consumption of sugary foods into overall dietary guidelines posed a challenge, in that for all other forms of macronutrients, the goals set were as a percentage of energy. A figure of 10% of energy from sugar emerged as a value equivalent to the consumption of sugary foods four times per day. Using data from dietary surveys in Irish adults, teenagers and children, the relationship between the percentage of energy gained from added sugars and frequency of consumption (on times per day) was examined.² The results are shown in **Figure 1**. Clearly, a relationship exists between percentage of energy gain from added sugars and frequency of added sugar intake, but this varies across age groups. This reinforces the value of adhering to frequency of intake of added sugars for the issue of dental caries rather than percentage of energy from added sugars.

Issue 2: Patterns of food intake in relation to frequency of added sugar intake

Where a relationship is found between the pattern of consumption of a particular food type and some public health condition, and when this observation is found across time and geographic locations, a powerful case exists for the targeting of that food in relation to the

public health condition. The possibility that such a relationship existed between the frequency of consumption of added sugars (a surrogate marker of dental caries) and the intake of particular foods associated with dietary added sugars, was examined by Joyce *et al.* (2008).² In the ensuing section, the data is presented solely for the intakes among consumers of the target foods, thus excluding non-consumers.

(a) The data for three food categories can be jointly considered since the findings are similar. These are: (i) table sugars and preserves; (ii) biscuits; and, (iii) cakes. In the case of children and teenagers, there was no statistically significant association between intake among consumers of these foods and the frequency of added sugar intakes. For each of these food categories, there was a strong statistical link for adults in this regard. The data are shown in **Table 1**.

Clearly, these foods are not an issue at a population level in relation to dental caries in children and teenagers, but they are very strongly associated with the main risk factor for caries in adults, namely frequency of added sugar intake.

(b) In this section, sugary drinks are considered. Carbonated sugar-containing beverages are frequently implicated as a contributory factor to dental caries. In the case of children, no statistically significant association was seen between frequency of added sugar intake and the consumption of fizzy sugared drinks. In the case of teenagers and adults, a statistically significant finding was observed and the data are summarised in **Table 2a**.

The same data for the food category squashes and cordials is given in **Table 2b**, where a statistically significant association between intakes and frequency of added sugar intakes was seen only for children and adults.

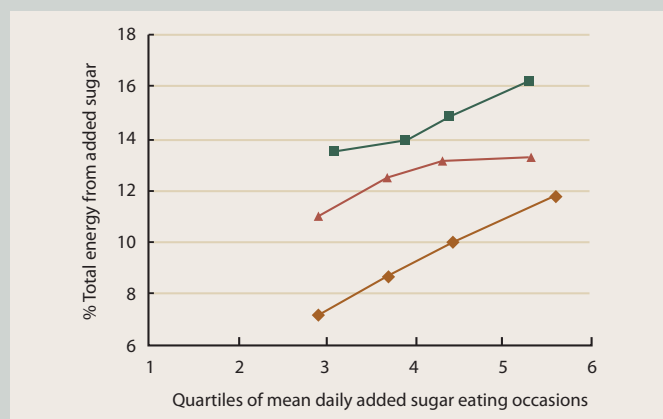


FIGURE 1: Relationship between the mean values for percentage total energy from added sugar and the quartiles of added sugar intake in Irish children (■), teenagers (▲) and adults (◆).

| Food category | Quartile 1 (lowest) | Quartile 2 | Quartile 3 | Quartile 4 (highest) |
|---------------------------|--|------------|------------|----------------------|
| | of the frequency of added sugar intake | | | |
| | Intake of food category g/d | | | |
| Table sugar and preserves | 16 | 21 | 25 | 37 |
| Biscuits | 14 | 17 | 23 | 27 |
| Cakes | 26 | 29 | 32 | 35 |

Table 2a: Intakes of fizzy sugared drinks in grams per day (g/d) among consumers only across quartiles of frequency of added sugar intakes.

| | Quartile 1 (lowest) | Quartile 2 | Quartile 3 | Quartile 4 (highest) |
|------------------|--|------------|------------|-------------------------|
| | of the frequency of added sugar intake | | | |
| Population group | Intake of fizzy sugar drinks g/d | | | |
| Teenagers | 234 | 243 | 188 | 165 |
| Adults | 173 | 169 | 173 | 199 |

Table 2b: Intakes of cordials and squashes in g/d among consumers only across quartiles of frequency of added sugar intakes.

| | Quartile 1 (lowest) | Quartile 2 | Quartile 3 | Quartile 4 (highest) |
|------------------|--|------------|------------|-------------------------|
| | of the frequency of added sugar intake | | | |
| Population group | Intake of squashes and cordials g/d | | | |
| Children | 81 | 79 | 76 | 133 |
| Adults | 92 | 108 | 88 | 111 |

Table 3a: Intakes of chocolate confectionery in g/d among consumers only across quartiles of frequency of added sugar intakes.

| | Quartile 1 (lowest) | Quartile 2 | Quartile 3 | Quartile 4 (highest) |
|------------------|--|------------|------------|-------------------------|
| | of the frequency of added sugar intake | | | |
| Population group | Intake of chocolate confectionery g/d | | | |
| Children | 17 | 19 | 20 | 25 |
| Teenagers | 18 | 19 | 29 | 33 |
| Adults | 16 | 16 | 21 | 25 |

Table 3c: Intakes of non-chocolate confectionery in g/d among consumers only across quartiles of frequency of added sugar intakes.

| | Quartile 1 (lowest) | Quartile 2 | Quartile 3 | Quartile 4 (highest) |
|------------------|---|------------|------------|-------------------------|
| | of the frequency of added sugar intake | | | |
| Population group | Intake of non-chocolate confectionery g/d | | | |
| Children | 11 | 11 | 18 | 16 |

Table 4: Intakes of ready-to-eat (RTE) breakfast cereals, breads and ice creams in g/d among consumers only across quartiles of frequency of added sugar intakes.

| | Quartile 1 (lowest) | Quartile 2 | Quartile 3 | Quartile 4 (highest) |
|------------------|---|------------|------------|-------------------------|
| | of the frequency of added sugar intake | | | |
| Population group | Intake of chocolate RTE breakfast cereals g/d | | | |
| Teenagers | 31 | 40 | 36 | 45 |
| Population group | Intake of breads g/d | | | |
| Children | 72 | 88 | 86 | 82 |
| Population group | Intake of ice cream g/d | | | |
| Adults | 35 | 46 | 48 | 51 |

Table 5: The contribution (in percentage terms) of each food category to the intake of added sugars.

| | Children | Teenagers | Adults |
|-----------------------------|----------|-----------|--------|
| Table sugars and preserves | 10 | 14 | 28 |
| Biscuits | 8 | 8 | 11 |
| Cakes, buns and pastries | 8 | 10 | 13 |
| Carbonated sugary beverages | 20 | 27 | 20 |
| Squashes and cordials | 15 | 12 | 10 |
| Chocolate confectionery | 15 | 18 | 15 |
| Non-chocolate confectionery | 12 | 12 | 8 |
| Breads | 5 | 5 | 8 |
| RTE breakfast cereals | 12 | 13 | 8 |
| Ice cream | 8 | 8 | 11 |

The obvious conclusion from this analysis is that the widely held view that frequency of added sugar intakes is associated with soft drinks, fizzy or otherwise, is not correct. The analysis on which these data are based did not extend to diet drinks, but one possibility is that at the upper end of frequency of added sugar intakes, where options exist to select a sugar-free variety, such options may be exercised. Squashes and cordials do not offer such an option and so feature highly at the upper end of frequency of added sugar intakes, particularly for children.

(c) This section will focus on confectionery and data are presented in **Tables 3a and 3b** for the relationship between frequency of added sugar intakes and intakes of chocolate (statistically significant

association for all age groups) and non-chocolate confectionery, respectively (statistically significant association for children only).

It would appear that for all populations, the frequency of intake of added sugars is driven in part by intakes of chocolate confectionery.

(d) The data for breads, ready-to-eat breakfast cereals and ice creams are presented in **Table 4** across quartiles of frequency of added sugar intakes. Data are included only for those population groups that show a statistical difference in mean daily intake of the target foods and frequency of intake of added sugars.

Both RTE breakfast cereals and breads would be important foods in shaping overall healthy eating and should not become a main focus

for dental caries. Ice cream is not of great importance here. Overall conclusion from a consideration of the contribution of foods to frequency of added sugar intake: there is no clear and obvious pattern that helps to shape a specific focus on one particular food category in relation to the frequency of added sugar intake.

Issue 3: Overview of the contribution of food categories to added sugar intake

Table 5 provides data on the contribution (in percentage terms) of each food category to the intake of added sugars. Clearly, the main sources for adults are: table sugars and preserves; biscuits, cakes and pastries; carbonated soft drinks; and, chocolate confectionery (accounting for 87% of added sugar intake). For teenagers, the main food categories are: table sugars and preserves; carbonated soft drinks; biscuits, cakes, buns and pastries; and, all confectionery (accounting for 89% of added sugar intake). For children, the main contributors are: biscuits, cakes, buns and pastries; carbonated soft drinks and cordials; all confectionery; and, RTE breakfast cereals (accounting for 90% of added sugar intakes).

Key conclusions

It would be wiser to focus any public health message on the frequency of intake rather than total intake since consumers probably recognise frequency as very important for dental health. It is impossible to single out a specific food group or selection of food groups, which are universally associated with the frequency of added sugar intake. Thus, the best strategy might be to simply focus on sugar-rich foods, which make a significant contribution to added sugar intakes (giving examples) and to advise on “snacking between meals”.

References

1. **Gustafsson, B.E., Quensel, C.E., Lanke, L.S., Lundquist, C., Grahnen, H., Bonow, B.E., et al.** The Vipeholm dental caries study. The effect of different levels of carbohydrate intake on caries activity in 436 individuals observed for five years. *Acta Odontol Scand* 1954; 11: 232-364.
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