

An assessment of nutritional information in oral health education leaflets

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Introduction: Dental caries prevalence in UK children remains high and obesity, closely linked to Type 2 diabetes, is rising. Literature suggests that dentists may not give dietary advice due to a lack of clear and consistent guidelines. **Objective:** The aim of the study was to determine whether oral health education leaflets with a food and nutritional focus conform to existing UK national nutritional guidelines from the Department of Health (DoH), the Food Standards Agency (FSA) and the Committee on Medical Aspects of Food and Nutrition Policy (COMA). **Method:** A sample of 30 information leaflets, aimed at parents and children aged 3–16 years, was sourced during the winter of 2005–2006. A qualitative content analysis was carried out to identify key recommendations on type, frequency and quantity of food and drink and general diet-related health advice. **Results:** Most leaflets (21) promoted milk and water in agreement with nutritional guidelines. Timing of sugary food and drink to mealtimes (25) and decreasing frequency of ‘sugary’ e.g. non-milk extrinsic (NME) sugar containing foods (22) and drinks (25) reflected guidelines. Inconsistencies were, however, recorded in the leaflets. Five leaflets advised that frequency of consumption rather than the amount of sugary food or drink was important for oral health. This conflicts with nutritional guidelines, aimed at tackling obesity, to decrease both amount and frequency. There was conflicting advice on healthy snacks. Crisps were presented as ‘healthy’ by two leaflets; another two advised against snacking on dried fruit, conflicting with FSA guidelines that dried fruit contributes to “5 a day”. Sixteen leaflets promoted cheese as ‘healthy’ with no limits on portion size; this could conflict with nutritional guidelines associated with percentage energy contribution of saturated fat to the diet. **Conclusion:** While there was agreement between leaflet content and nutritional guidelines, there were inconsistencies. Dental professionals should acknowledge these when selecting leaflets for lay dissemination.

Key words: Education, leaflets, nutrition, oral health.

Introduction

Both oral health and obesity are directly related to diet and nutrition. Dental caries remains the most significant dental public health problem in the UK and concerns have been expressed over the potentially rising prevalence of erosion (Office of National Statistics, 2003; Pitts *et al.*, 2007). Obesity, especially in children, is increasing dramatically across the country (Jackson-Leach and Lobstein, 2006) and is associated with an increased risk of type 2 diabetes in the young (Drake *et al.*, 2002)

Dental professionals have a role in supporting their patients to adopt appropriate dietary habits. The Department of Health recommends that:

‘Dental practitioners should give dietary advice, including reduction of non-milk extrinsic sugar consumption as an important part of their health education to patients’ (COMA; DoH, 1989, p. 42)

One study has found that many dentists do not give dietary advice; when it is given, it is often ad hoc, usually as a single statement with little interaction with the patient (Moynihan, 2002). In a more recent study, preventive dietary advice given to parents of young children was found to concentrate on sugar consumption but the advice given was found to vary in quality and was often subjective in nature (Threlfall *et al.*, 2007).

This reticence to provide dietary advice may be due to a lack of clear, consistent information as to what advice should actually be given regarding sugary and acidic food and drinks and their mode and frequency of consumption.

Oral health education leaflets with a food and nutrition focus are used by dental professionals as a means of communicating dietary advice. While the value of health education leaflets may be debated, it has been reported that they can be patients’ only access to health information and, thus, they have a useful role in health education (Murphy & Smith, 1993; Dyer *et al.*, 2005). Furthermore, many health professionals, when asked, feel that leaflets have an important function in supporting verbal advice (Murphy & Smith, 1993). It is essential, therefore, that any dietary advice given to promote oral health is in accordance with general nutritional messages, thereby strengthening the common risk factor approach to health promotion and public health and minimising conflicting and confusing messages to the public (Kearton, 2003).

Aim

The aim of this study was to determine whether oral health education leaflets with a food and nutritional focus conform to existing UK national nutritional guidelines. The objective was to compare the following benchmark

guidelines with the information contained within the leaflets:

The DoH (1989) Dietary Sugars and Human Disease (COMA report no. 37)

The DoH (1991) Dietary Reference Values for Food Energy and Nutrients for the United Kingdom (COMA report no. 41)

The FSA (2006): Eatwell website www.eatwell.gov.uk

Method

A sample of 30 professionally accredited and/or commercially sponsored UK information leaflets, aimed at parents and children aged 3-16 years, was sourced during the winter of 2005/6.

Leaflets were sourced based upon availability from two UK community dental clinics, (one in South Wales, the other in North Wales) as well as the Paediatric Dentistry Unit, University Dental Hospital (Cardiff) and the Training and Education Centre for Dental Care Professionals at Cardiff University's School of Dentistry.

A manual qualitative content analysis (Babbie, 1991) was carried out to identify key recommendations on type, frequency and quantity of food and drink and general diet-related health advice. The strengths and weaknesses of the oral health leaflets in relation to national nutritional guidelines were identified and recommendations for best practice determined.

Results

Table 1 illustrates the sponsorship and accreditation status, the intended audience and the date of publication, if available, of the sourced leaflets.

Table 2 demonstrates the range of advice relating to drinks. The majority recommended that sugary/acidic drinks be restricted to meal times (83%); 70% advised that only milk and water should be drunk.

Five of the leaflets included potentially confusing messages regarding carbonated drinks:

"Drink straight from fridge – acid is less harmful cold." (Source: Comic Company, 2004)

"Drink fizzy drinks through a straw." (Source: Comic Company, 2005)

"Fizzy and sugary drinks – drink no more than one or two a day." (Source: Comic Company, 2005)

Some of the images used in some of the leaflets were identified as potentially confusing with regards to drinks advice (Fig.1), while others were more consistent with the benchmark UK national nutritional guidelines used in this study (Fig. 2).

The leaflet represented in Fig.1 gives cause for concern not so much because of the text on the page, but because of the visual representation of a huge glass of fizzy drink being consumed via a straw. In contrast, the leaflet represented in Fig. 2 highlights the positive message that "Milk and water are best for teeth".

Advice limiting the consumption of sugary foods (Table 3) was contained in the majority (27) of leaflets. Five of the leaflets specifically stated that it was the frequency of consumption rather than the amount of food or drink that was important for oral health, for example:

"The main point to remember is that it is not the amount of sugar you eat or drink, but how often you do it." (Source: Tell me about: Diet, British Dental Health Foundation (BDHF), 2006b)

"Eat or drink all in one go rather than nibbling or sipping." (Source: Growing up with healthy teeth, the Sugar Bureau, 1998)

"For teeth, how often you eat sugar is more important than how much." (Source: Do you take sugar?, Health Education Authority, date unknown)

Twenty- two (73%) of the leaflets recommended fresh fruit and vegetables as healthy snacks (Table 4). Other foods advised as healthy snacks included cheese, milk or yoghurt and savoury snacks such as chapattis, rice cakes and breadsticks. Two of the leaflets recommended crisps as a healthy snack, whilst two others advised that dried fruits specifically be avoided:

"... Try to stick to cheese, vegetables and fruit but not dried fruit." (Source: BDHF Tell me about: Children's teeth, 2006a)

Over half of the leaflets recommended cheese as a snack (Table 4), with five leaflets advising eating cheese after a meal or an acidic snack. With regards to the quantity of cheese consumed, three leaflets stated in the text that a small quantity was preferable. An equal number of leaflets, however, illustrated a large portion (Figs. 3 and 4).

Three (10%) of the leaflets included information linking high intakes of sugary food to obesity, diabetes and heart disease. There is strong evidence to support a relationship between sugar consumption and obesity, which may lead to heart disease and diabetes. The World Health Organisation's expert committee considers that sugar consumption contributes substantially to the obesity epidemic, and recommends a limited intake (World Health Organisation (WHO), 2004). A further four leaflets (13%) gave an explanation of a balanced diet.

Discussion

We recognise that while some of the leaflets provided by commercial bodies are without a commercial agenda, others may be compromised. The messages contained within leaflets should, therefore, be read with due consideration of their sponsorship (Ballam, 1996, Table 1).

All of the leaflets analysed contained some drinks advice. The observation that 70% recommended that only milk and water should be drunk is gratifying as it reflects current advice from the FSA to drink only milk and water between meals (FSA, 2006), advice from the COMA panel that lactose and milk products have no adverse effect on health (DoH, 1989 & 1991) and recent National Health Service (NHS) advice (published after the research was conducted) to parents that the best drinks for children aged over one year are water and milk (NHS, 2007). It is, however, unclear as to why 30% of the leaflets did not contain this key message. Research by Chestnutt *et al*, (2003) has shown that some parents regard milk as a foodstuff and do not give milk between meals and have never tried to give their children water. This demonstrates the difficulty in spreading the 'milk and water only' message and highlights a need to encourage parents

Table 1. Leaflet details

<i>Type of Leaflet</i>	<i>Available from</i>	<i>Sponsorship</i>	<i>Likely Audience</i>	<i>Publication Date</i>
Chomp! Let's see them gnashers!	The Dairy Council	Commercial	Primary school children	2005
Looking after children's teeth	The Dairy Council	Commercial	Parents/Healthcare professionals	2004
Tiny Teeth	The Dairy Council	Commercial	Parents of pre-school children	2006
Growing up with healthy teeth - a guide to caring for you children's teeth	The Sugar Bureau	Commercial	Parents of primary school children	1998
Looking after your baby's teeth	The Sugar Bureau	Commercial	Parents of pre-school children	2001
Toothcare update 7: Food for healthy living	The Sugar Bureau	Commercial	Parents of children all ages and adults	date unknown
Acid attack	Comic Company	Independent education resource	Primary school children	2004
Smile please: The Good Teeth Guide	Comic Company	Independent education resource	Children all ages and adults	2005
Baby's and Children's teeth	Macleans	Oral hygiene industry	Parents of children all ages and adults	date unknown
Caring for your children's teeth	GlaxoSmithKline Consumer Healthcare	Oral hygiene industry	Parents of children all ages and adults	no date
Diet and tooth erosion	GlaxoSmithKline Consumer Healthcare	Oral hygiene industry	Parents of primary school children/ adults	no date
Give your child something to smile about	Macleans	Oral hygiene industry	Children all ages and adults	1999
Help your child have a wonderful smile	Colgate Palmolive Ltd	Oral hygiene industry	Parents of primary school children	date unknown
Know more about... eating for healthy teeth	Oral B	Oral hygiene industry	Children all ages and adults	date unknown
Looking after your family's teeth: A survival guide	Colgate Palmolive Ltd	Oral hygiene industry	Children all ages and adults	date unknown

Table 1. (continued)

<i>Title of Leaflet</i>	<i>Available from</i>	<i>Sponsorship</i>	<i>Likely Audience</i>	<i>Publication date</i>
Looking after your teeth	Stafford Miller (Sensodyne toothpaste)	Oral hygiene industry	Children all ages and adults	no date
Looking after your teeth as you grow up	Stafford Miller (Sensodyne Junior)	Oral hygiene industry	Primary school children/Parents	no date
Diet and dental caries	British Nutrition Foundation	Charitable organisation	Parents of children all ages and adults	2004
Healthy Eating for School-Aged Children	British Nutrition Foundation	Charitable organisation	Parents of children 5+years	2004
Caring for your children's teeth: toothcare for 3-11yrs	Health Promotion Wales	Professionally accredited	Parents of primary school children	date unknown
Diet and your child's teeth	General Dental Council	Professionally accredited	Parents of children all ages and adults	1993
Do you take sugar?	Health Education Authority	Professionally accredited	Children all ages and adults	date unknown
Drinks and Dental Health	Greater Glasgow NHS Pharmacy Health Promotion	Professionally accredited	Primary school children/Parents	date unknown
Give teeth a chance	www.healthscotland.com	Professionally accredited	Children all ages	1999
Looking after young teeth	University of Southampton	Professionally accredited	Primary school children/Parents	1999
Looking after your mouth	Health Education Authority	Professionally accredited	Children all ages and adults	1996
National Smileweek Newsletter	British Dental Health Foundation	Professionally accredited	Parents of children all ages and adults	2005
Tell me about: Children's teeth	British Dental Health Foundation	Professionally accredited	Parents of children all ages and adults	2006
Tell me about: Diet	British Dental Health Foundation	Professionally accredited	Parents of children all ages and adults	2006
Tell me about: Diet and my teeth	British Dental Health Foundation	Professionally accredited	Parents of children all ages and adults	2006

Table 2. Drinks advice given by leaflets

<i>Advice</i>	<i>%</i>	<i>n</i>
Limit timing of sugary/acidic drinks to meal-times	83	25
Drink only milk and water	70	21
Reduce frequency of consumption of sugary/acidic drinks	50	15
Included confusing messages	16	5

Table 3. Advice on limiting sugary foods

<i>Advice</i>	<i>%</i>	<i>n</i>
Limit consumption or reduce frequency of sugary foods	90	27
Restrict sugary or acidic foods to meal-times and not at night	76.6	23
Check product labels for "hidden sugars"	40	12
Avoid sweets	20	6
Frequency of consumption rather than amount	16.6	5

Table 4. Snack advice

Advice	%	n
Fruit and vegetables	73.3	22
Cheese	53	16
Savoury snacks	46.6	14
Milk or yoghurt	26	8
Crisps	6.6	2
Avoid dried fruit	6.6	2

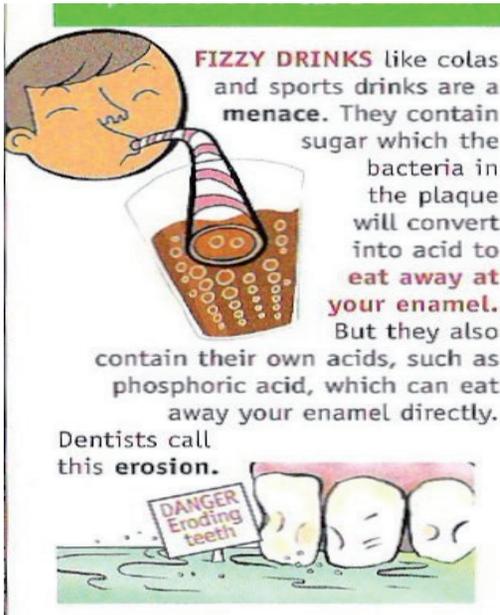


Figure 1. Source: *Smile Please: The Good Teeth Guide*, Comic Company (2005)

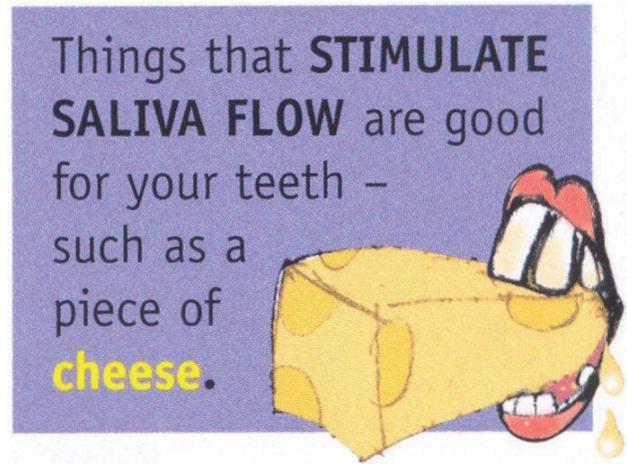


Figure 3. Pictorial representation of cheese (Source: Comic Company, 2005)

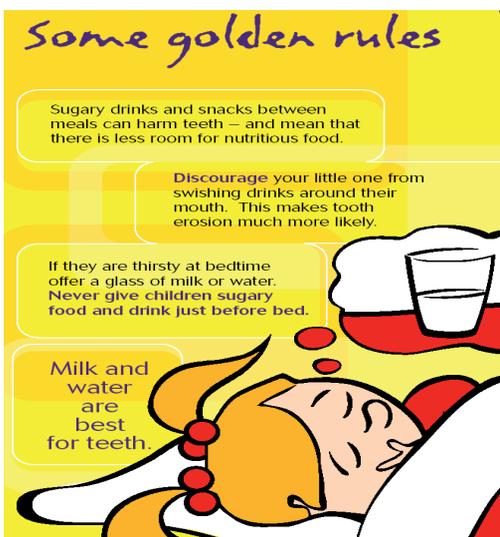


Figure 2. Source: *Tiny Teeth: The Dairy Council* (2006)



Figure 4. Pictorial representation of cheese (2) Source: Stafford Miller (no date)

in this area, rather than confuse them with the minutiae of fizzy drink consumption methods (Fig 1.). Moreover, Bawa (2005) has described the role of consumption of beverages in the obesity epidemic. He reported that high intakes of soft drinks are linked to overweight and obesity due to additional calorie intake in the diet, and also that there is an increased risk of osteoporosis due to displacement of milk consumption, leading to calcium deficiency and consequent bone resorption. This again emphasizes the necessity to encourage milk and water consumption in patient information leaflets.

The relationship between frequency of consumption of fruit/acidic/fizzy drinks and erosion is now well established and the advice to limit the timing of sugary/acidic drinks to mealtimes by most of the sample (25) echoes advice given in the FSA's nutritional guidelines (FSA, 2006) and NHS advice to parents (NHS, 2007).

Whilst most of the drinks advice in the oral health leaflets conformed to UK nutritional guidelines it was worrying that five leaflets contained messages which undermine the key message of promoting milk and water as drinks suitable for young children e.g.:

"Drink straight from fridge- acid is less harmful cold" and *"Drink fizzy drinks through a straw"*

The rationale for this type of advice stems from research that has found acid erosion depth increases significantly with increasing temperature (Dugmore and Rock, 2004) and that drinking acidic drinks through a straw reduces the potential for tooth erosion (Edwards *et al*, 1998).

Though scientifically correct, advice of this type has the potential to mislead the public into viewing fizzy drinks as safe if consumed in these ways (Fig. 1).

The recommendation to drink no more than one/two cans of fizzy and sugary drinks a day by two of the leaflets (Comic Company, 2004 and 2005), if followed, would sanction up to 14 cans of carbonated drink per week to be consumed. A study by Dugmore and Rock (2004) reported that risk of erosion increased by 50% with each additional intake of carbonated drink per day. A leaflet sanctioning 14 cans of carbonated drinks per week would put a child at risk of dental erosion and, more worryingly, obesity (Malik *et al*, 2006).

Reassuringly, 90% of the sample recommended limiting the consumption or reducing the frequency of sugary foods (Table 3), which is consistent with the COMA panel recommendations (DoH, 1989, 1991), the DoH and British Association for the Study of Community Dentistry guidelines (DoH and BASCD, 2007) and NHS advice to parents (NHS, 2007).

Just over three quarters (23) of the leaflets recommended limiting sugary or acidic foods to mealtimes (Table 3), which reflects the advice given by the FSA's Eatwell website (FSA, 2006). These leaflets also referred to restricting consumption of sugary foods at or before bedtime. Although there are presently no formal UK nutritional guidelines to limit these foods before or at bedtime there is research evidence to support this advice (Levine, 2001).

Only 12 of the leaflets gave advice to check labels for sugar content or to look for 'hidden sugars' as recommended in the COMA and FSA national nutritional guidelines (DoH, 1989 & 1991; FSA, 2006). Chestnutt *et al*, (2003) found that although parents were aware that

sugar was harmful for teeth they had difficulty in identifying foodstuffs that were safe for teeth. For example, when mothers were interviewed about their choice of drinks for their children, some felt that giving their child a juice drink like Sunny Delight® was a healthy choice for teeth and general health because it contained vitamins; they were unaware of the high NME sugar content of this beverage. Parents and children need better advice on checking food and drink labels to identify sources of sugar. Two main types of voluntary nutrition labelling are used in the UK. The current FSA nutrition labelling system consists of multiple traffic lights (FSA, 2008), whilst the Institute of Grocery Distribution advocates the use of Guideline Daily Amounts (Institute of Grocery Distribution, 2008). This latter system is preferred by many UK food manufacturers and retailers. Consequently, labels vary in quality and their interpretation can lead to confusion (Kearton, 2003; Which?, 2008). Simplified food labelling systems are presently being investigated by the FSA, in the UK and the European Union Expert Working Group on Nutritional Labelling in terms of front of pack food labelling (European Commission, 2008).

While it was of concern that only six leaflets specifically advised avoidance of sweets, a further five leaflets stated that it was not the amount of sweets/sugary foods eaten that mattered but the frequency of consumption (Table 3). This contradicts advice given in the COMA report that states the consumption *and* frequency of intake of sugar containing food and drinks should be reduced (DoH, 1989, 1991). 'The Scientific Basis of Oral Health Education' (Levine and Stillman-Lowe, 2004), states that the amount of NME sugar has been shown to be independently related to caries experience and, as amount and frequency are strongly related, advice must be to reduce both amount *and* frequency of NME sugars. The advice from these five leaflets is thus misleading for parents and children; it suggests that any amount of sugar is healthy as long as it is taken within a discrete (non-identified) time period. From a nutritional perspective, consuming large amounts of sugar on a regular basis reduces children's appetite for more nutritious foods and drinks and could in the long term lead to obesity and consequent type 2 diabetes (Drake *et al*, 2002; WHO, 2004).

The majority of leaflets (22) recommended fresh fruit and vegetables as healthy snacks (Table 4), which is in agreement with guidelines to increase consumption of fresh fruit and vegetables (FSA, 2006) and guidelines produced after the research was conducted (DoH and BASCD, 2007; NHS, 2007).

Two leaflets recommended avoiding dried fruit in order to prevent dental caries; this advice relates to the fact that they have a high cariogenic potential (DoH and BASCD, 2007) and tend to stick to teeth (Stillman-Lowe, 2003). This is an example of how conflicting health messages can confuse consumers (Kearton, 2003). Avoiding dried fruit conflicts with national nutritional guidelines, in particular the most prominent public health message of recent times ('5 a day' (NHS, 2006)). Furthermore, the National School Fruit and Vegetable Scheme encourages children to consume fruit, including dried fruit, as snacks between meals (DoH, 2007). Consumption of fruit and vegetables is notoriously low in children across the UK, averaging 2.7 portions per day (Gregory *et al*, 2000),

thus the value of eliminating dried fruit as a measure to prevent dental caries needs to be balanced against the health gains obtained from encouraging children to eat any fruit or vegetable. A lack of direction with regards to frequency of consumption of dried fruit could be compromising children's oral and general health, given its cariogenic potential, its high calorific value, and the manner in which it is marketed specifically towards children in small snack size portions. The most up to date advice for dentists regarding dietary recommendations and oral health (which was not published when this research was undertaken) lacks clarity with regards to dried fruit consumption; it indicates it is a cariogenic food but also plays on the importance of five a day and leaves the reader to make their own decision about frequency of consumption (DoH and BASCD, 2007). Therefore the authors suggest the message should be 'dried fruit only once a day as a snack' similar to the advice on fruit juice which only counts once towards the 5 a day target (NHS, 2006).

Two of the leaflets provided outdated oral health advice that crisps constitute a healthy snack. This advice conflicts with the FSA guidelines which promote fruit and vegetable rather than crisp consumption (FSA, 2006). In recent years crisp manufacturers have tried to improve their snacks by reducing fat, particularly saturated fat, and yet crisps and similar savoury snacks are important contributors to the high energy, fat and salt intakes of UK children (Gregory *et al*, 2000).

The evidence from the leaflets (Table 4) reflects that cheese is viewed as a healthy snack by the dental profession. This is based on evidence that chewing cheese stimulates the flow of saliva; this is alkaline in nature and has a buffering effect on the acids formed in dental plaque (Kashket and DePaulo, 2002). There may also be an increased oral clearance rate of sugar due to the cheese-stimulated high saliva flow rate (Linke and Riba, 2001). Some research has suggested that cheese may reduce the levels of cariogenic bacteria and its high calcium and phosphate ion content may be a factor in its cariostatic mechanism (Lewinstein *et al*, 1993). However, from a nutritional perspective the 'The Eatwell Plate' recommends moderate consumption of dairy products like cheese because they are high in energy, saturated fat and salt (FSA, 2006).

Advice to eat a piece of cheese after every meal may lead to excessive consumption and undermines general nutritional health messages aimed at decreasing consumption of saturated fats and salt to prevent diseases such as coronary heart disease and hypertension, respectively. There is evidence that as little as 5g of hard cheese is effective against dental caries in children (Gedalia *et al*, 1992). A portion size of 5g would not lead to excessive saturated fat or salt in a child's diet.

Images in oral health education leaflets are used as a powerful communicator, attracting the eye and reducing the need to use text. This is particularly important when children are the target audience. During the course of this research three examples of imagery confused a basically simple message. In the first of these cheese is depicted as a suitable snack (Figure 3), with justified text reasoning for this:

"Things that stimulate saliva flow are good for your teeth.....such as a piece of cheese".

The piece of cheese, however, is so large that it is twice the size of the mouth depicted next to it. No reference to portion size is made in this leaflet.

The second example depicts cheese (Fig. 4) alongside water, milk and an apple. However, the size of the cheese portion needs to be much smaller. The weight represented using the 200ml glasses and an eating apple as comparators indicates a portion size of 380g (Nelson *et al*, 1997). This could be an appropriate pictorial representation if the cheese portion had been much smaller e.g. 5-10g. The placing of a cracker on the plate with the cheese would make this small portion easier to grasp and interpret in light of dietary guidelines.

The third misleading illustration is a visual representation of a child drinking a large glass of fizzy drink using a straw (Fig 1). Whilst, the text points out that *"fizzy drinks like cola'sare a menace"* the image contradicts the nutritional guidelines (FSA, 2006). It would have been better if the child had been drinking a glass of milk or water, to promote a positive education message, as seen in Fig. 2.

The pictures in the leaflets may cause confusion and mislead parents and children. Portion size reduction is seen as an important factor in reducing obesity rates (FSA, 2006) and dental caries (DoH, 1989 & 1991, Levine & Stillman-Lowe, 2004).

Disappointingly, only three (10%) of the leaflets included information linking high intakes of sugary food to diabetes and heart disease; a further four leaflets (13%) provided an explanation of a balanced diet. Risk factors for dental diseases such as diet, plaque, smoking and alcohol are common to other chronic diseases. A common risk factor approach to oral health promotion would exert a favourable effect not just on dental caries but several diseases simultaneously. This would avoid duplication and confusion of health messages and could lead to more effective management of health service resources in terms of both effectiveness and efficiency.

Conclusions

While there was general agreement between leaflet content and nutritional guidelines, there were inconsistencies. These concerned quantity, frequency and duration of intake and conflicting advice with regards to healthy foods and drinks for oral versus general health. As part of their continuing professional development, dental professionals should keep up to date with national nutritional guidelines so that they can screen oral health education leaflets to ensure consistency of public health messages for lay dissemination.

Consistent health messages underlie the development of personal skills, a fundamental principle of the Ottawa Charter for health promotion (WHO, 2008; Schou and Locker, 1997). It is essential that valid, evidenced based and consistent health messages are made available to the public and a common risk factor approach is taken to oral health education.

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