

## Sugar at different stages in life; from childhood to old age

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### Abstract

The chapter reviews and updates the role of the different types of sugar along the life cycle, mainly during infancy and aging, but also for physiological situations such as pregnancy and breastfeeding. Moreover, several examples from infancy to the elderly illustrate that a moderate consumption may be considered as adequate within the context of a healthy diet and active life.

In addition, the importance of sugar to provide palatability to the diet is also revised and attempted. The consequences of low sugar consumption (e.g. glucose) are also evaluated, but also the potential hazard effects of high and prolonged intakes at the different ages or pregnancy, as well as its association with risk factors for chronic diseases.

Finally, recommendations are given for adequate consumption to serve as tools for a benefit/risk evaluation at individual level and for public health strategies.

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Key words: *Carbohydrates. Sugars. Infancy. Adolescence. Aging. Pregnancy.*

### EL AZÚCAR EN LOS DISTINTOS CICLOS DE LA VIDA; DESDE LA INFANCIA HASTA LA VEJEZ

### Resumen

Se revisa la importancia que tienen los diferentes tipos de azúcares consumidos a través de la dieta y en diferentes fuentes alimentarias en las etapas de la vida y situaciones fisiológicas especiales, y como el consumo moderado de azúcar es compatible con una dieta equilibrada y estilos de vida activos.

Se describe también su función en el disfrute y placer de comer, como uno de los pilares básicos también de una alimentación equilibrada. Al mismo tiempo, se evalúan los riesgos del consumo muy insuficiente, principalmente en lo referido a un bajo aporte de glucosa en etapas críticas de la vida, así como las potenciales consecuencias negativas sobre el estado de salud en el ciclo vital cuando la ingesta es excesiva, y la asociación con factores de riesgo en enfermedades crónico-degenerativas, o con complicaciones en el embarazo.

Finalmente, se aportan recomendaciones para un correcto consumo desde el punto de vista nutricional que constituyan, finalmente, herramientas válidas para una evaluación beneficio/riesgo a nivel individual o desde el punto de vista de la salud pública.

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Palabras clave: *Hidratos de carbono. Azúcares. Infancia. Adolescencia. Envejecimiento. Embarazo. Gestación.*

### Abbreviations

FAO: Food and Agriculture Organisation of the United Nations

WHO: World Health Organisation

EFSA: European Food Safety Authority.

IOTF: International Obesity Task Force

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### Introduction

Barb Stuckey states in her book, "*Taste, What You're Missing*", that *the sweet taste resonates loudly in our subconscious and, what is more, that it's very difficult for someone to try sugar and say that it doesn't taste good*. This statement is valid for all age groups and physiological circumstances, and two important considerations should be made which are very valid for the specific topic that will be tackled: Good nutrition should be based on an inseparable binomial, health and pleasure, with logical exceptions, such as artificial feeding in hospital or very high dependency; secondly, we will require, at different stages in life, sufficient information and tools that will enable us to assess the benefits versus the risks of the regular consumption of

certain foods and drinks, to ultimately achieve a balanced, healthy and pleasurable diet.

The main function of sugar is to provide our body with the energy that it needs so that the different organs, such as the brain and muscles, function; an essential function throughout life and its physiological circumstances. The brain alone is responsible for 20% of energy consumed from glucose, although it is also an essential source of energy for all of the body's tissues. If it fails the body starts to suffer from certain disorders: weakness, tremors, mental dullness and even fainting (hypoglycaemia). Such critical and anabolic ages of cognitive expansion, i.e. infancy or adolescence, serves as an example: one of the most common mistakes when it comes to food is avoiding or not eating enough breakfast, when in fact it is the most important meal of the day. Breakfast should provide the energy required to start our daily activities, as at this time our blood sugar is at its lowest. Scientific evidence shows that breakfast should provide a quarter of daily calories and nutrients. For this reason moderate sugar consumption should be included, along with other foods, not only for its energy input but also because it sweetens and brings flavour to foods which make them easier to eat, as well as drinks which at this point transport essential nutrients. This previous statement is equally valid for population groups which are proportionally higher in our country, the elderly, pregnant or breastfeeding women, or sportspeople who require more energy. Throughout this chapter other examples are illustrated, while, as with other dietary components, what may be beneficial if we follow nutritional recommendations, can clearly become harmful when consumption is excessive or lifestyles are inappropriate.

Sugar consumption is particularly important because it allows glycogen stores to be increased and replenished, both in the muscles and the liver. Whether the work is physical or intellectual, sugar consumption is still advisable in adulthood. It is a food that provides energy which is rapidly assimilated by the body, enabling a fast recovery for people who have a physically demanding working day, although the actual reality is that jobs and our general lifestyles are becoming more sedentary, a situation which involves the need to adjust the total energy intake to energy expenditure. Therefore it's essential to provide consumers with the necessary tools to better understand the nutritional aspects of the foods they eat by means of correct food labelling, so that by scrutinising them they can choose the products which are more suitable. It is very common for women to follow some kind of low calorie diet. In this case it's very important to know the benefits of sugar consumption for a successful diet. It's high level of palatability contributes to the success of any weight loss regime, because it encourages the consumption of key foods that are part of any balanced diet. Most weight loss

diets, for example, no matter how well they are planned from a nutritional point of view, fail shortly after they have started because they are not appetising as the importance of one of the main senses, taste, is often left out. Also the pleasure of eating is particularly important in the elderly population as their sense of taste and smell declines, and requires a higher concentration of sugar to detect the same sensation of sweetness, provided that this does not involve an increase in the risk of conditions such as cardiovascular disease, type 2 diabetes or excess body weight, which is also reflected in this chapter. In this respect, sugar consumption for this population group increases satisfaction when it comes to eating. In short, it's a matter of bringing this pleasure back to the elderly so that they can enjoy the great benefits of eating, which contributes to making their lives more pleasant. These sensory problems also affect an individual's nutritional status, which may lead to a reduction in food and energy intake. This is where sugar plays an important role, boosting the consumption of other foods like yoghurts, milk, fruit, etc., and of course the nutrients and bioactive components they contain.

Due to all the above, below is a summarised but detailed *road map* of the role of sugar, its benefits and risks, throughout the different stages of life as well as in certain special physiological situations and predisposing risk factors for certain disorders associated with food, without ever forgetting that the individual should be free to make decisions about their own diet; self-reliance and willpower should be maintained until the eating process has finished.

## Weaknesses

### General

The exact daily requirements for carbohydrates in human nutrition are not currently well-defined. Nevertheless, the recommendations and objectives in our Western countries indicate that they should provide between 55 and 60% of total dietary energy, recommendations which are not currently being met in Spain, unlike the situation in our society only a generation ago.

Foods with a high glycaemic index, such a particular type of cakes and pastries, *snacks* or certain drinks, are rapidly digested, their glucose reaches the blood stream in a short space of time, causes spikes in blood sugar and requires larger quantities of insulin.

### Nutritional density of the diet

One of the most talked-about effects of the excessive consumption of sucrose, is the reduced consumption of other nutrients, especially macronutrients, which at

**Table I**  
*The main features of SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) during the different stages of life*

**WEAKNESSES**

- During pregnancy an excessive increase in sugars in the diet could predispose women to excessive pregnancy weight gain and an overgrowth of the foetal placenta. This situation could also be linked to the development of gestational diabetes.
- Similarly, it could also contribute to higher incidences of tooth decay.
- During childhood and adolescence an excessive consumption of sugars in the diet could displace the intake of other nutrients as well as increasing body weight and the incidence of tooth decay and possible hyperactivity disorders.
- During adulthood, the excessive consumption of sugars could displace the intake of other nutrients, lead to excess weight or obesity, increase insulin resistance, increase the risk of cardiovascular disease, as well as tooth decay.
- In the elderly, an increase in sugars in the diet could lead to nutritional imbalances, obesity and an increased risk of tooth decay or developing diabetes.

**STRENGTHS**

- During pregnancy it produces an increase in glucose available to the foetus, which constitutes this sugar as an essential and preferential substrate.
- In newborns, as a result of pancreatic amylase deficiency, it is recommended that milk formulas for infants contain lactose as the main carbohydrate and the addition of glucose is also permitted as it can be hydrolysed on the enterocyte's borders.
- During sports activities, they enable blood sugar to be maintained during exercise and muscular glycogen to be replenished as quickly as possible following exercise.
- In the elderly they bring about drastic changes in the perception of basic tastes and in particular sustain the sweet flavour, which is very important for maintaining appetite and the transportation of nutrients that are essential at this stage in life.
- The moderate consumption of sugar, in the context of a balance diet and active lifestyle, is a component which makes healthy food more enjoyable.

**THREATS**

- The perception that carbohydrates are fattening, harmful or non-essential has meant that their contribution to the diet's energy content ('calorie profile') decreases when purchasing power increases, and vice versa. Against this background, polysaccharide consumption has decreased the most, whereas proportionally sugars like sucrose or fats and proteins have increased.
- Changes in the consumption of fresh foods in favour of processed foods with high quantities of added sugars.
- A reduction in adherence to the Mediterranean diet.
- The vulnerability of the youngest members of society to advertising messages.

**OPPORTUNITIES**

- Nutritional education campaigns to raise awareness and to circulate the message that the moderate consumption of sugar is compatible with a nutritionally balanced diet containing the required micronutrients and dietary fibre.
- With regard to preventing tooth decay, effective preventive measures have to be put into place and not just stopping the consumption of sucrose and other sugars, as it has been observed that, with appropriate oral hygiene, dietary composition has a minimal effect on the incidence of tooth decay.
- The use of low calorie or non-caloric sweeteners as a substitute for added sugars to reduce the total energy intake, in the event of excessive consumption, particularly in overweight or sedentary individuals.

certain stages in life lead to nutritional imbalances that could compromise health. This is due to the fact that sugar mainly provides energy and therefore some authors have suggested that its high consumption could displace other nutrients in the diet, resulting in a nutritionally unbalanced diet<sup>1</sup>. However, this view had not been verified by the few research studies that have been carried out using suitable methodology<sup>2</sup>, and have demonstrated that both the intake of energy and of other nutrients are above the recommendations when the various increases in sugar intake during childhood and adolescence are assessed, therefore, they admit that it is difficult to determine the dose of sugar that could jeopardise children's health and the claims could only be justified, where effects were mentioned, for the highest levels of consumption.

During pregnancy, the mother's diet, especially the type and content of carbohydrates, affects both the mother and the foetus, since it had been proposed that foods containing simple sugars, as is the case with sucrose (with a medium glycaemic index) can predispose them to excessive pregnancy weight gain and an overgrowth of the foetal placenta, that could even cause foetal macrosomia in newborns, which, in the majority of cases, is a result of maternal or gestational diabetes. On the other hand, low-GI diets do not reduce the incidence of macrosomia, but they do have a significant positive effect on the mothers' pregnancy weight gain and glucose intolerance<sup>3</sup>. Therefore, the excessive consumption of foods with an elevated simple sugar content are not recommended during pregnancy, with the exception of foods that

mainly contain fructose (fresh fruit that are ripe enough).

In the case of elderly people, the situation may be very different, as the moderate consumption of simple sugars could even help to stimulate the appetite and could be a valid tool, provided that they are consumed in moderation, for transporting different nutrients that are of great interest to this age group (i.e. calcium or Vitamin D which are consumed in sugared dairy products). Once again, which has been mentioned in the introduction to this chapter, from the scientific evidence it is too simplistic to consider the negative or positive effects of a nutrient in isolation and in a consistent manner for all age groups and physiological situations.

### *Excess weight and obesity*

The prevalence of excess weight and obesity has increased over the past few years in the majority of so-called industrialised countries and those in transition. It is estimated that around 200 million children of school age are overweight and around 50 million are obese according to the IOTF (International Obesity Task Force), due to excessive energy intake from products that have a high energy content and a low nutrient density, but mainly due to the current inability to compensate by means of adequate energy expenditure.

Carbohydrates are macronutrients that provide our bodies with energy, therefore excessive consumption of them can result in the disorders and pathologies that have previously been mentioned, although there is no clear evidence that changing the proportion of total carbohydrates in the diet is the final deciding factor on energy intake. What there is growing evidence of is the excessive consumption of sugary drinks (which contain sucrose or a mixture of glucose and fructose), along with inactive lifestyles and an increase in total fat consumption, which is associated with increased energy consumption, weight gain and the development of metabolic and cardiovascular disorders<sup>4</sup>. Fortunately, there are a large amount of reformulated drinks currently available on the market, with a very low or virtually zero energy content, which together constitute more than 30% of the total market. What is more, a systematic review carried out by Malik et al.<sup>5</sup> showed a positive association between the excessive consumption of sugary drinks and weight gain in children and adults. The most recent data available (2012) on the nutritional interpretation of the Spanish diet produced by the Spanish Nutrition Foundation, via the Food Consumption Panel, shows that for the group of non-alcoholic drinks, the contribution to the total energy consumed by the adult population is approximately 3%.

Furthermore, it has been observed that excessive pregnancy weight gain and the mother's eating habits

during pregnancy, especially the mother's consumption of high sugar foods or drinks, may have an impact, increasing her offspring's weight from the earliest stage of life<sup>6</sup>. However, it's a controversial issue, as an analysis<sup>7</sup> that compares and contrasts obesity trends, both in children and adults, and sugar consumption in Australia over the past 30 years with data from the USA and the UK, revealed an inverse relationship between sugar consumption and the prevalence of obesity, i.e. there is an increase in this disease with a reduced consumption of refined sugar. So, a reduction in sugary drink consumption may not be an effective and adequate strategy for reducing obesity. Therefore, there is still no clear evidence that involves sugar directly in obesity, although it has to be taken into account that an excess of energy also comes from simple carbohydrates or any other energy-providing macronutrient and is already associated with a sedentary lifestyle, which would benefit this condition if it is not offset with adequate energy expenditure.

### *Insulin resistance and diabetes*

Diabetes mellitus is a syndrome that is characterised by chronic hyperglycaemia which is accompanied by changes in carbohydrate, fat and protein metabolism. Insulin resistance can be modulated by dietary factors, and of these, carbohydrates are the nutrients which have the greatest impact on blood sugar. In general, at all stages of life, an intake equivalent to 50-60% of total energy consumed in the form of complex carbohydrates is recommended, leaving simple carbohydrates (monosaccharides and disaccharides) consumption to be reduced to those found in milk and dairy products (lactose) and fruit and vegetables (sucrose and fructose). However, the current reality of the Spanish diet shows a percentage that is well below recommendations, slightly higher than 40%. Nevertheless, the most recent recommendations for diabetic patients indicate that the amount of carbohydrates and monounsaturated fatty acids should account for between 60-70% of total calorific value. For this reason, the total amount of carbohydrates in a meal is considered more important than the type or source of food<sup>8</sup>.

Generally, there are no studies that directly link sugar consumption with diabetes, although a strong association has been observed between the excessive and prolonged consumption of sugary drinks and an increased risk of metabolic syndrome and type 2 diabetes<sup>9</sup>. On the other hand, it was observed that high rates of type 2 diabetes are connected to changes from more traditional diets to those that are more cariogenic and high in fat.

Meanwhile, during pregnancy, gestational diabetes mellitus can arise which is an intolerance to carbohydrates of varying severity, irrespective of the type of



treatment used to achieve metabolic control, whether it is diet or insulin, whether it persists or not once the pregnancy has finished<sup>4,10</sup>. Therefore, gestational diabetes is actually 'prediabetes' and in most cases is the early stage of developing type 1 or 2 diabetes. So every woman diagnosed with gestational diabetes is a subsidiary of diabetic treatment<sup>11</sup>. A pregnant diabetic's diet should be neither low calorie nor restrict carbohydrates. Only refined sugars and products that contain them in large quantities (cakes, sweets, jams and soft drinks) should be avoided or at least limited, in accordance with energy requirements at different stages in life and for different physiological circumstances.

### *Dental health*

The prevalence of tooth decay in the Spanish population is approximately 36.7% at 6 years of age, increasing to 45% at 12 years of age and 54.8% in 15 year old adolescents, from the age of 35 tooth decay is widespread, affecting between 92 and 94% of the adult population, according to the results of the latest national epidemiological survey conducted by the General Council of Odontology and Stomatology in 2010<sup>14</sup>. Furthermore, today we know that tooth decay can even affect the elderly. In fact, the Spanish Oral Health Study (2010) has shown that in people over the age of 65%, 94% have an average of fourteen decayed teeth, which are not treated in the majority of cases. Nowadays we know that the prevalence of tooth decay is more related to age, social class and hygiene levels with fluoride.

The frequent consumption of simple carbohydrates is significantly associated with a higher risk of tooth decay<sup>15</sup>. Likewise, the consumption of sugary soft drinks is also linked to an increase in both the prevalence and incidence of this oral process<sup>16</sup>. However, this relationship is complex since it is not just sugars that contribute to the development of tooth decay, due to the fact that this process is also interconnected with the frequency of tooth cleaning, the use of fluoride, as well as saliva composition, so a simplistic and exclusive relationship associating tooth decay with sugar consumption is not scientifically admissible.

### *Hyperactivity*

From the 1970s until the 1990s it was argued that sugars were involved in hyperactivity among young children, described as Attention Deficit Hyperactivity Disorder. It has been observed that the research studies that proposed there was a link between sugar and hyperactivity had problems with their methodology<sup>17</sup>. Therefore Wolraich et al.<sup>18</sup> published a meta-analysis which concluded that sugar does not affect children's

behaviour, although it does not rule out the slight effect of sugar on a subset of children, with special characteristics or risk profiles.

### **Threats**

In addition to their regulatory and structural role, carbohydrates are the main source of energy, as well as the cheapest and most abundant, at the same time as being the quickest and most easily obtainable by our metabolism. However, the widespread perception that carbohydrates are fattening, harmful and non-essential, which effectively means that, in general, their contribution to the diet's energy content ('calorie profile') decreases as purchasing power increases, and vice versa. This phenomenon has also been observed in Spain over recent years. In this inadequate calorific profile, it is complex carbohydrates that are reduced the most, while, proportionally, certain carbohydrates such as sucrose or fats and proteins are increased. For the nation as a whole, carbohydrate intake amounts to around 300 g/day, which represents 40-45% of total calories.

During pregnancy of the nutrients that the mother has to continuously provide to the foetus via the placenta, glucose is quantitatively the most important, followed by amino acids, so much so that the foetus' metabolism and development depend directly on the nutrients that come from the mother. As a result of the high amounts of glucose that the foetus needs from its mother, this can lead to the development of hypoglycaemia during the third trimester of pregnancy, especially when fasting. Furthermore, during this physiological circumstance changes in eating habit usually occur, cariogenic diets become more important in relation to different foods, which could result in a substrate for bacteria, although understandably for the duration of this physiological state, it could in any case be considered a transitory phenomenon of little relevance.

The development and industrialisation of our countries is leading to changes in eating habits, magnified by the economic crises that have been happening in recent years. The changes in consumption from fresh foods to very processed foods, with high quantities of added sugars, a reduction in adherence to the Mediterranean diet, the vulnerability of our youngest members of society to advertising messages, amongst other things, give rise to nutritional risk factors in the entire population.

Similarly, the incorporation of adults into the world of work, the stress caused by an unhealthy lifestyle, a reduction in physical exercise, possible scenarios that may lead to anxiety states or poor eating habits, are some of the most important factors that can lead to weight gain through the abuse of processed foods with a high percentage of calories, saturated fats or simple sugars.

Furthermore, the energy cost per nutrient in processed foods that can provide more energy, more total fat and simple carbohydrates, may be considered a threat, an even more in times of economic crisis such as the current one which is being experienced throughout Europe. These lifestyle could, on a long-term basis, cause unfavourable situations for adults through an increase in insulin resistance, an accumulation of glucose in the body's deposits or the presence of diabetes mellitus in the population (one of the most common illnesses, together with high blood pressure, at this age).

On the other hand, the aging process affects the metabolism of nutrients, so that the diet should be perfectly tailored to each elderly adult's situation. If we add to this the inability or unwillingness to engage in physical exercise, the presence of illnesses or polymedication, this can dramatically increase the onset of hyperglycaemia, changes in insulin resistance or the development of diabetes.

## Strengths

In general carbohydrates are the main source of energy, which are easier to obtain and metabolise, and they are better value for money, which could be of interest in certain situations and for vulnerable or marginal groups of the population.

Carbohydrates can be stored and used when the body needs energy, turning them into glycogen in the liver and muscles, or converting them to fat. On the other hand, and by no means less important, they are the main source of energy for the nervous system and the blood cells, which is certainly an essential aspect of all stages and physical situations in life, but especially in pregnancy, for newborns, athletes or the elderly. From a cognitive point of view, it is considered that glucose can primarily improve the short-term storage and retrieval of information. Also in old age, with widespread memory loss, adequate glucose levels help to maintain it. And of course, a satisfactory performance in learning tasks, as is the case for children and adolescents, can be stimulated by adequate glucose levels.

Carbohydrates have an anti-ketogenic effect, at the same time as being protein-saving. Furthermore, monosaccharides can be produced from certain amino acids and glycerol; however, more than 100g/day of this nutrient is needed in order to avoid a high protein catabolic process, the possible increase in ketones or cation loss.

Due to Spain's location, the Mediterranean diet is the best available example of a traditional diet; a great deal of interest has also been generated both inside and outside its geographical area, thanks to different epidemiological studies which have shown that the Mediterranean diet is associated with lower mortality and lower rates of cardiovascular disease. In the first

few years of the new millennium data showed that Mediterranean countries obtained around 50% of their total dietary energy from carbohydrates. Despite the reduction of carbohydrate intake compared with the sixties in countries like Greece, Spain or Italy, the intake of simple sugars is still well below 10% of the total caloric value of the diet<sup>19</sup>. When more carbohydrates are consumed, less fats are eaten, and it must be considered that the energy value per gram of nutrients is less than half, an aspect which is also important in the design of adequate energy density diets.

Furthermore, sugar has properties that can have a positive effect on the diet, such as appetite suppression, i.e. it has a certain satiety potential. In addition, it is also well known that the presence of sugar in the preparation of recipes improves their palatability, which is very important in the elderly.

In relation to the strengths that sugar presents during the different stages of life, the following should be highlighted:

- During pregnancy it produces an increase in glucose availability for the foetus, which constitutes this sugar as an essential and preferential substrate.
- In newborns, as a result of pancreatic amylase deficiency, it is recommended that infant milk formulas don't contain starch, they should, on the other hand, contain lactose as the main carbohydrate and the addition of glucose is also allowed, as it can be hydrolysed on enterocyte's borders.
- During sports activities, they enable blood sugar to be maintained during exercise and muscular glycogen to be replenished as quickly as possible following exercise. Nowadays good sports nutrition practice does not make sense without an adequate supply of sugar, as a component that regulates exertion. Hence the wide range of *sports drinks* for different conditions and situations.
- In the elderly a drastic change in the perception of basic flavours occurs, and it is precisely the sweet taste that is maintained. This is of great importance for maintaining appetite and avoiding frequent involuntary weight loss in the elderly and malnutrition that is all too frequent in our Western countries.

## Opportunities

Due to the fact that poor eating habits are leading to the consumption of excessive amounts of simple sugars, to the detriment of complex carbohydrates, it is a matter of priority that nutritional education campaigns be carried out to raise public awareness that the high consumption of these carbohydrates may seriously compromise health if they are not consumed in

an appropriate manner. However, in the same campaigns, the message should be conveyed that a moderate intake of sugar is compatible with a nutritionally balanced diet containing the required amounts of micronutrients and dietary fibre.

Nowadays the majority of diabetic treatments allow for the moderate inclusion of sucrose and other added sugars (30-50g/day) in the diet, provided that it is a balanced diet and good long-term metabolic control is maintained. Accordingly the Food and Agriculture Organisation of the United Nations (FAO) and the World Health Organisation (WHO) Recommend eating a wide range of foods rich in carbohydrates, mostly processed cereals, fruit and vegetables, as well as the moderate consumption of sugars<sup>20</sup>.

Furthermore the WHO and FAO proposed the implementation of effective preventative measures to prevent tooth decay in children and not just stopping the consumption of sucrose and other sugars, as it has been observed that, with appropriate oral hygiene, dietary composition has a minimal effect on the incidence of tooth decay<sup>21</sup>.

Finally it should be mentioned that the American Heart Association and the American Diabetes Association<sup>21</sup> suggest using low calorie or zero calorie sweeteners as a substitute for added sugars as it is an option for reducing total energy intake and also as these sweeteners don't increase blood sugar levels, they may be an option for diabetics. Although they also show that sweetener use should be considered in the context of overall diet when they are used to control body weight.

## Recommendations

During the first months of life carbohydrates provide 40% of total energy from breast milk, with lactose being the main carbohydrate. This percentage gradually increases during the first year of life until they reach the range established for adults.

Although cultural and gastronomic patterns are usually difficult to change in adulthood, nutritional recommendations have been proposed that are easily achievable such as the use of low calorie or zero calorie sweeteners, limiting the consumption of cakes and pastries that are high in fat and simple sugars, sweetened drinks or certain sweets and desserts that may be high in simple sugars and that provide extra calories, taking part in regular physical exercise or eating a balanced diet.

The Committee of Experts from the European Food Safety Authority (EFSA)<sup>22</sup> has proposed that total carbohydrates should provide between 45 and 60% of the total energy intake and <10% of the total energy intake from sugars for all age groups, except for children under the age of 2. On the other hand, the Spanish Society for Community Nutrition in 2011<sup>23</sup> decided not

to establish limits on the consumption of sugars and sugary foods, although they suggest that the total energy intake should not exceed 6%. Similarly, certain proposals have been made for quantifying sugar intake recommendations: 32-37g for a 2,000 kcal diet for men, and around 25g for women, for children it is calculated at about 12 g/d and approximately 25 g/d for adolescents, even though factors have to be considered such as a tendency to suffer with acne or other dermatological problems that might affect the previous recommendations.

It has also been proposed that sucrose should be avoided or limited when it is used as a sweetener, as well as in industrially prepared foods, that is consumed in excess. Longitudinal studies suggest that if infants become used to the sweet taste from an early age they will continue this preference during childhood and adolescence. However, there are no guidelines that mark or set the amount of sucrose or other sugars that should be consumed at this stage, therefore efforts should be made to limit the introduction of sweet foods or the sweetening of processed foods, in order not to establish unbalanced and cariogenic eating habits.

## Conclusions

Carbohydrates are essential nutrients that should be part of the diet during the different stages and physiological situation in life, according to recommendations. The associated problems are determined by excessive consumption and not by their presence. Although polysaccharides should be found in the highest proportions, sugars are also compatible with a balanced healthy diet and they are particularly important during the stages in life that require a significant amount of glucose for the continual processes of attention and learning (infancy) or for appetite maintenance and so that other critically important nutrients can be transported, as is the case in elderly people, without forgetting their importance when practicing sport properly. Sugar, even in very moderate amounts, is a very important source of pleasure in the diet for certain age groups; it is a cornerstone to ensure proper nutrition.

Finally, it is essential to carry out short term nutritional balance studies, with mono- and disaccharides, that enable specific requirements to be established for the different population groups in Spain, without posing the risk of associated chronic degenerative illnesses.

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