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Children and adolescents need protection against energy drinks

PERSPECTIVES

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Energy drinks are high-risk products that should not be part of a young person's diet. Due to the harmful effects, the sale of energy drinks to children and adolescents should be prohibited.

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Revenues from the sale of highly caffeinated drinks in Norway reached new heights in June 2018 with almost 3 million litres sold in one month, an increase of 400 000 litres from May 2018 and more than a 60 % increase since June 2015 (1). These products are increasingly consumed by children and adolescents. A total of 19 %, 53 % and 70 % of young people in the age groups 10–12 years, 13–15 years and 16–18 years, respectively, state that they sometimes consume energy drinks (2). In 2015, the corresponding percentages were 8 %, 32 % and 62 % (3). The rapid growth in the proportion of children and adolescents that consume energy drinks is cause for concern (4).

The Ministry of Health and Care Services shares this concern and has asked the Norwegian Food Safety Authority to explore various measures to protect children and adolescents against health damage from consuming large quantities of energy drinks. Before discussing how the health authorities should address the risk that energy drinks pose to children and adolescents, we will describe the harmful effects of energy drink intake.

More than caffeine

Energy drinks can best be described as industrially designed soft drinks that contain multiple stimulants (ginseng, guarana, taurine, etc.) in addition to caffeine (usually 320 mg/l or more). Sugar or sweeteners hide the taste of bitter ingredients such as caffeine and taurine, making them more palatable to children and adolescents. In addition, B-vitamins are added to make the drinks seem healthy. Because energy drinks are consumed like soft drinks and contain stimulants that reinforce each other as well as carbonation which increases the speed of caffeine uptake in the blood, they are associated with a greater health risk than coffee, although coffee has more caffeine (approx. 500 mg/l).

Energy drinks are potent due to their diverse combination of stimulants. This is shown, for example, in a randomised, double-blind, controlled crossover study that measured the effect of an energy drink and a caffeinated control drink, both containing 320 mg/l caffeine, on 18 healthy young adults. Two hours after intake of the energy drink, the research subjects showed a significantly longer QT interval, a risk factor for fatal heart arrhythmia, than after intake of the same amount of the caffeinated drink. Both drinks caused an increase in systolic blood pressure, but six hours after consumption this figure was significantly higher for the energy drink than for the caffeinated drink (5). The combination of caffeine and other ingredients, such as sugar, may be a contributing cause of the serious effect; however, more research is needed to confirm the potentially causal link between the agents. It is extremely regrettable that children and adolescents have unrestricted access to addictive products that increase blood pressure and, in the worst case, cause serious heart arrhythmia.

Caffeine poisoning

Although energy drinks contain more than caffeine, we cannot ignore the risk associated with caffeine exposure. High caffeine intake in a short period of time can result in serious conditions such as heart failure, heart arrhythmia and kidney failure, which at worst can be fatal in vulnerable individuals. Isolated incidents of caffeine poisoning have been reported in a number of countries (6). High intake of energy drinks has also been linked to two cases of cardiac arrest in adolescents (7). Adolescents with undiagnosed heart disease can have a higher risk of organ failure. In Norway, too, children have been admitted to hospital with serious organ failure as the result of drinking large quantities of energy drinks in a short period of time (8). We believe there is a genuine risk of more cases of serious caffeine poisoning in children and adolescents resulting from high and rapid consumption of energy drinks.

Insomnia and behavioural problems

Children and adolescents have reported agitation, irritability, nervousness, concentration difficulties, abstinence symptoms and other negative effects after consuming energy drinks (6), (9–11). Caffeine dosages of 1.4 mg/kg body weight can affect a person's ability to fall asleep and reduce the length of sleep (12). Over time, these effects can lead to more serious behavioural and health problems (6). In children and adolescents disposed to anxiety disorders, it has been documented that caffeine-induced anxiety can also occur already at low levels of caffeine intake, i.e. under the 'safe' limit of 2.5 mg per kg body weight (9).

As far back as 2008, before the sale of energy drinks was allowed in Norwegian grocery stores, it was estimated that about 20 % of Nordic teenagers were at risk of exposure to caffeine levels from energy drinks that could cause anxiety and agitation (10). Children and adolescents are in a phase of life where mental disorders often go undiagnosed. The increasing normalisation of energy drinks could potentially result in more cases of caffeine-induced anxiety in young people.

Children and teenagers who consume energy drinks are more likely to use alcohol, tobacco or illicit drugs (13). When energy drinks are mixed with alcohol, the caffeine's stimulating properties are combined with alcohol's depressive properties and a reduction in behaviour control. The combination is associated with an increase in risk-seeking behaviour, damage to the health of young users, and more frequent use of other illicit substances (14). In Norway, 42 % of 15- to 18-year-olds who consume energy drinks have tried mixing energy drinks with alcohol (2).

Dependence

Caffeine is a central nervous system stimulant that affects numerous functions in the body. When the body becomes used to exposure, it requires a regular supply of the relevant substance in order to avoid physical discomfort (10). Symptoms of caffeine abstinence include headache, tiredness, anxiety, irritation and a bad mood, which children and adolescents also report. In 2008, it was estimated that 10 % of children with the highest consumption of caffeinated drinks ingested more caffeine than 2.5 mg per kg body weight (10). It is likely that normalising the consumption of energy drinks results in more children and adolescents developing a dependence on caffeine with the subsequent likelihood that they will experience symptoms of caffeine abstinence.

Limit for tolerable intake?

In Norway, children and adolescents are advised against consuming more than 2.5 mg caffeine per kg body weight per day, regardless of the source (15). This value is used to calculate the amount of energy drink that children can be exposed to without risk: A child weighing 30 kg exceeds the maximum limit (75 mg) by consuming a small can of energy drink (2.5 dl), which corresponds to 80 mg. An adolescent weighing 60 kg exceeds this same limit by consuming half a litre. In Norway, there are definitely more young people than previously who exceed the recommended maximum limit for caffeine after energy drinks came on the market, and the proportion is increasing.

In our view, it is highly problematic to recommend a safe limit of this kind, especially when it is used to calculate so-called 'safe' consumption of energy drinks. Both European and Norwegian scientific committees have concluded that there is a great deal of uncertainty around the risk assessments of caffeine for children and adolescents, partly because there are so few studies on these groups (12, 16, 17). According to a Canadian panel of experts, some EU countries have criticised the European risk assessment for having a too narrow approach to the health hazards, for focusing on caffeine rather than on energy drinks and for not being realistic about consumption of energy drinks in combination with alcohol among adolescents (18). Furthermore, the harmful effects of energy drinks are considerably greater than those that can be attributed caffeine alone.

Norwegian health authorities should *not* set safe limits for caffeine exposure in children and adolescents, both because the data are insufficient, but most importantly because caffeine has psychopharmacological and central nervous system stimulating properties that young people should not be exposed to.

Precautionary principle

The precautionary principle is fundamental to public health efforts and should be applied in the risk management of energy drinks for children and adolescents (19). Scientific certainty is achieved primarily through randomised, controlled studies, which cannot be conducted with harmful substances. Although we cannot carry out such studies, we have substantial and convincing scientific evidence that energy drinks can damage the health of children and adolescents. It would therefore be unethical, an experiment with young people's health, *not* to take action. A lack of proven knowledge should not be used as a justification for failing to establish measures. When the precautionary principle is applied, it is the responsibility of the manufacturers to prove that their products do not represent a health risk (19, 20).

Experiences from other countries

In the EU, Lithuania (2014) and Latvia (2016) introduced a ban on the sale of energy drinks to individuals under 18 years old. Both Sweden and the UK have processes underway similar to that in Norway, where regulating the sale of

energy drinks is among the measures being considered in order to protect children and adolescents against the health damage from consumption of such drinks.

Ban on sale to children and adolescents

Before 2009, energy drinks were regulated like pharmaceuticals and could not legally be sold in Norwegian grocery stores due to their high caffeine content. At that time, Norwegian authorities tried to resist liberalisation from the EU, which nevertheless led to deregulation. Today there are no regulations that prevent children and adolescents in Norway from purchasing energy drinks. Despite the health authorities' warnings to young people, intake is increasing in multiple age groups. It is well documented that these highly caffeinated drinks constitute a public health problem, especially for children and adolescents. Energy drinks are associated with significant risks and have no nutritional value. There is sufficient knowledge about the detrimental effects of energy drinks for young people's health and behaviour to introduce comprehensive measures. We believe it is time to consider a ban on the sale of energy drinks to individuals under 18 years.

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