

Why Drinking Carbonated Beverages and Energy Drinks are Detrimental to Children's Oral Health?

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Abstract

These days, we all know more and more about the disadvantages of drinking soda pops and energizer drinks and we are aware that the dangers of these tasty and pleasant drinks are a multiplier for children. Disadvantages which are hidden behind these popular drinks in the world, for the majority of parents may be unknown. Unfortunately, the popularity of this drink has been increased among children, which has consequences like the incidence of obesity, dental caries, dental erosion, cardiovascular and respiratory disorders, malnutrition, osteoporosis, and so on. It is good to know that diseases do not occur overnight, but it will happen over the years, due to poor dietary habits. Hence, parents should try to minimize or even put away the use of carbonated beverages and energizer drinks; instead, should promote drinking water and natural juices in the family if they are concerned about their children's health.

Keywords: *Soda Pops and Energy Drinks; Obesity; Dental Caries; Dental Erosion; Cardiovascular And Respiratory Disorders; Malnutrition; Osteoporosis*

Introduction

One of the consequences of modern lifestyle and lifestyle-related diseases is tooth exposure to the excessive amounts of the acidic and sugary substances. An abrupt increase in the consumption of carbonated drinks, dietary drinks, and citrus acid juices seems more important than other causative factors. The consumption of these substances as available and popular drinks has increased for all ages. Unfortunately, water consumption in children has significantly been decreased and the consumption of these beverages has tremendously increased [1].

Soft drinks cause obesity in children due to its high sugar content when they are consumed along with fast foods. If the growth of these children is above normal, they are at risk of diabetes or early maturation, especially if they have background to diabetes. Drinking too much carbonated soft drinks in children, in addition to disrupting calcium absorption [2] and tooth decay [3], can cause digestive problems [4] and obesity [5]. The phosphorus in the beverage causes a disruption of the growth development of children [6] and the onset of Rickets [7] in them.

The teeth, like the bones, are not safe from the damages of the high acidity of these beverages which can cause severe erosion and destruction of the enamel.

Phosphoric acid in carbonated beverages removes calcium ions from the bones and causes anemia [8] and osteoporosis [2]. These drinks also cause malnutrition in children because they prevent the appetite of children, thus nutrients cannot reach the child body [9].

Research has shown that carbonated beverages and industrial juices are used repeatedly by children, with 40% of six years old children drink more than twice a day, and 25% of them even once a day [10].

It should be noted that the diseases associated with the consumption of energizer drinks have increased, and have side effects such as heart problems, liver failure, seizures, and even death. Given that dietary habits usually start from childhood, parents should be careful about buying drinks and do not let their children get used to the taste of these malicious drinks.

The main ingredients of energizer drinks

Energy drinks containing various materials are as follows:

- **Ginseng:** It is one of the ingredients included in energy drinks or herbal teas in small amounts or sold as a dietary supplement [11]. The common ginsengs are generally considered to be relatively safe even in large amounts [12]. One of the most common and characteristic symptoms of an acute overdose of P. ginseng is bleeding. Symptoms of mild overdose may include dry mouth and lips, excitation, irritability, tremor, palpitations, blurred vision, headache, increased blood pressure [12].
- **Caffeine:** After having the energy drink, the person experiences the most effects of that on cognitive performance. Guarana is one of the densely populated South American herbs that its seeds contain large amounts of natural caffeine. Its seeds are used as a stimulus to enhance the ability and reduce fatigue. The symptoms might include the increased attention and reaction speed of the individual which are primarily due to the presence of caffeine [13].
- **Creatine:** An organic acid that is useful for muscle energy production [14]. But experts do not recommend using it at all.
- **Glucuronolactone:** This substance is added to stimulate metabolism and to quickly obtain energy [14]. Glucuronolactone like Taurine also has a detoxifying effect, but little research has been done about it.
- **Ephedrine:** A stimulant that affects the central nerves of the body, which is commonly used in weight-reducing drugs [15,16], but has detrimental effects on the function of the heart.
- **Taurine:** The natural amino acid that regulates the heart rate and function of the muscles, which is still controversy about its usefulness to the body [17].
- **Vitamin B complex:** A group of vitamins that can convert sugar in the beverage to energy and build the muscles. Of course, these vitamins are artificial and do not do the main thing.
- **Sugar:** The sugar or carbohydrate content of these beverages is usually available as a mixture of simple sugars with fast absorption and more complex carbohydrates with slow absorption. The amount of sugar in energy drinks is usually much higher than that of conventional sports drinks.
- **Preservatives:** Besides the active ingredients in energy drinks, there are other chemicals placed in energy drinks to give them a longer shelf-life and a more vibrant color. The most commonly used preservatives in these types of drink include Citric acid, Sodium benzoate, Potassium Sorbate, Benzoic acid, Sorbic acid, Calcium Disodium EDTA, Potassium benzoate [18].

Carbonated soft drinks components

Carbonated drinks are one of the most popular drinks in Western culture. It has been consumed by the majority of people and even worse, it has been very popular among children. Most soft drinks are characterized by carbonated water, sugar, and caffeine. But different companies may add different flavors to it. Here, we list the most ingredients which may found in soft drinks.

Water: Soft drinks contain mostly water. The factories usually use softened water to make the taste of their products better [19].

Sugars and sweeteners: The second main ingredient is sugar which makes up 1 - 12% of a soft drink. Sucrose, glucose, or fructose is used as natural carbohydrate sweeteners. This sugar can preserve and enhance the flavor of a drink and gives a satisfying sensation [18]. Aspartame is 200 times sweeter than sucrose and leaves no unpleasant aftertaste. European Food Safety Authority (EFSA) approved aspartame for use in food and beverages [20]. Saccharin (E954) is 300 times sweeter than sucrose but it has a bitter/metallic aftertaste [21]. There are other less common sweeteners which are out of our discussion and it is not necessary to go through in further details.

Caffeine: The main active ingredients in the carbonated soft drinks are the alkaloids caffeine. It is added as a stimulant, but it has a bitter taste that is a component in many soft drinks [13].

Carbon dioxide and acidity modulators: The carbonation of soft drinks makes the drink more acidic and gives a sensational flavor and taste [22]. It also helps preserve soft drinks for longer time [23]. On the other hand, acidity regulators are used to improving the taste of soft drinks [24]. Acids also play an important role in the natural preservation of soft drinks [25]. Citric acid is the first choice for use as an acid regulator, which also plays as antioxidants.

Phosphoric acid is the second regulator that gives a specific taste to carbonated-type beverages. High levels of phosphorus in the blood, referred to as "hyperphosphatemia" can lead to vascular calcification and cardiovascular disease [26-28].

Flavoring and coloring: There are three basic categories of colorings which the soft drinks companies may use in their products. They include natural colors, artificial colors, and caramels. Natural colorings can be extracted from plants, fruits, and vegetables. Natural colorings are also added to soft drinks for their antioxidant properties [29]. It seems the demands for natural colors are increased in the last decade so that the majority of the manufacturers have reduced the use of artificial colors in their products.

Preservatives: Chemical preservatives are used to improve the microbiological stability of soft drinks. The main preservatives allowed and used in soft drinks are sulfur dioxide, Sorbic acid, and its salts and Benzoic acid and its salts [30].

Complications of consumption of carbonated and energy drinks

Soda drink is one of the most popular drinks that people today consume. Even so, we don't believe most parents truly understand the detrimental effects of it on children's health.

As matter of fact, it has become a growing concern and potential for dental health issues for dentists (especially pediatric dentists) nationwide as regarding the consumption of soft drinks has been increased by children.

Soda drinks and energy drinks are the most popular drinks that people today consume. These beverages, which are presented in fine cans, have found their places among beverages.

Although many people believe their ingredients are safe, parents should know that their use, especially if they are used regularly, will have side effects on the health of their children. Hence, knowing these main complications will make them be more cautious about family beverages consumption.

Addiction to caffeine: Some children may become dependent on a carbonated drink. The caffeine content of the beverages causes this addiction which can solely reduce child's concentration, difficulty in sleeping, depression, confusion, and even nausea [31]. Caffeine is a stimulant that can suppress the central nervous system. A low level of consumption of Caffeine would cause an increase in consciousness and elevation of the levels of energy [31]. Caffeine can increase heart rates and cause arrhythmia, and even may lead to nerve disorders [31]. A child who is accustomed to drinking caffeinated beverages may suffer from a headache, pain, arthritis, and even occasional depression [31].

Dental caries: One of the most important issues we are facing today is the unhealthy use of juveniles and youths from carbonated, energizer beverages and sugary snacks that. As a result of increased physical activity, they tend to increase their consumption of these substances which cause irreparable damage to the body and teeth.

In these types of beverages, the presence of CO₂ compounds and their conversion to carbonic acid, prevent the absorption of calcium of food and thus cause the skeletal and osteoporosis problems [2]. On the other hand, gradual dissolution of enamel, results in superficial discoloration of the tooth and teeth sensitivities which definitely leads to dental caries [3].

The best substitute for carbonated drinks and snacks are water, milk, natural fruit juices and a variety of nuts, which has been well placed in the children's diet in the past. Besides, it not only does not have the effects of tooth decay but also provides the body with calcium.

Osteoporosis: These kinds of beverages, in addition to high sugar content, contain phosphate salts that interfere with the intake of calcium, and ultimately the continuous consumption of carbonated drinks would cause the lack of calcium, followed by osteoporosis which leads to self-bone fractures [2,32].

Phosphoric acid, in addition to causing digestive problems, increase the in the blood which may lead to excessive pH loss (acidification). Hence, the body in order to prevent this uses the stored calcium from the bone.

In fact, phosphoric acid in the beverage causes the calcium to be removed from the bones; on the other hand, for the calcium absorption from the digestive tract, there is a need for balance between calcium and phosphorus levels.

When this equilibrium disturbed by drinking carbonated beverages containing phosphoric acid, calcium absorption from the gastrointestinal tract also disrupted. Therefore, the body uses calcium stored on the bone on one side and on the other hand cannot easily absorb the calcium, thus suffering from calcium deficiency, reduction of bone density, and ultimately osteoporosis [2,32].

ADHD: Most parents notice changes in their child's behavior after taking carbonated or energy drinks. In this context, a number of children are more sensitive and more affected.

There is a direct relationship between the consumption of sugar in the beverages and the overactive children [34,35]. The reason for their hyperactivity is an increase in glucose levels in the body [35].

The processed sugars in the beverages enter the bloodstream and put the child's body in a position that feels that it has a higher energy level and more activity.

Carcinogenic: There have been many studies that have looked at the links between various types of cancer and fizzy drink consumption. They suggest drinking both soft and energy drinks could increase the chance of developing prostate, pancreatic, breast cancers [36,37].

Heart diseases: Excessive sugar in the blood disrupts the normal state of the veins and the amount of salt in the body. Excessive consumption of soft drinks due to high caffeine causes high blood pressure [38]. In fact, caffeine causes the extracellular adrenal glands to secrete more, and it's the adrenaline that increases blood pressure. Consistent and regular drinking even increases the risk of stroke [39].

Energy drinks can also affect blood pressure and secretion of the body's hormones. Of course, the effect of each one is different; some more and some less affect the body. The consumption of carbonated beverages by preventing calcium absorption can lead to increased blood pressure in consumer.

Disturbing digestive system: Almost all of the ingredients and components in the carbonated and energy beverages are harmful, and there are no useful substances in them. Colorless drinks, although having a lack of chemical colorants, they have a lot of disadvantages, and their use is not recommended.

Drinking with the goal of digesting food or having a drink with a meal by no means is advisable. After consuming fatty foods, if a child drinks a soft drink or any other liquid, the digestive acids will be diluted; thus digestion will be difficult.

In other words, in the entire pathway of the digestive system, only the stomach can withstand the acidic environment. But in other organs of the digestive system such as the mouth, throat, and esophagus, the acidic environment becomes abnormal after consuming carbonated drinks since these pathways are very sensitive and vulnerable to acid.

The phosphoric acid in these beverages affects the proper functioning of the stomach. On the other side, when the stomach is inefficient, the consumed food is not digested properly and leads to indigestion [4].

Obesity: Carbonated beverages are mainly made from refined water, artificial additives, and refined sugar. Therefore, they lack any nutritional values, and it is only because of the high sugar content, which makes them high in calories; lead to obesity in consumers [5]. In dietary drinks, aspartame is used instead of regular sugar. Although it stimulates the appetite, it may also be harmful to health and causes side effects such as headaches and migraine [40], dizziness, irritable moods, insomnia, seizure and reduced memory capacity [41].

Formation of the kidney stones

When the phosphoric acid in the blood increases, the kidneys are not able to rapid excretion, so excess pressure is imposed on the kidneys. The consumption of carbonated or energy drinks causes calcium to be removed from the bones and flows into the bloodstream, which results in the deposition of excess calcium in the kidneys, which ultimately leads to kidney stones [42].

Diabetes

Drinking too much carbonated and energy drinks is not only harmful to the stomach, but it also increases the risk of pre-diabetes. Consuming these kinds of beverages can be directly linked to occurrence type 2 diabetes [43] because of the high content of artificial sweeteners may be the main reason. The artificial sweeteners in the beverages will change the response of the intestines to glucose and provide the body for the onset of diabetes. Diet carbonated drinks increase the risk of diabetes, heart disease, and stroke.

Solution

Give the child a reward for leaving the habit of soft drink and encourage him to stop that by approaching him by the appropriate method. Parents should know that in order for their children to leave this kind of drinking habit, they have to start from themselves and take the action to be the first one.

Conclusion

Soft drinks are a mixture of water, colorants, and flavors, and carbon dioxide which due to the presence of colored materials and carbon dioxide, can lead to disorders such as osteoporosis, urticaria, respiratory, gastrointestinal and behavioral complications. Dental erosion is one of the causes of high consumption of carbonated and energizer drinks in children. The sugar in these drinks causes dental caries, weight gain, obesity, and complications such as diabetes, cardiovascular disease. Consequently, excessive consumption of these drinks will have serious risks and lead to irreversible injuries in children.

Because there are many different scary ingredients in soft drinks, more and more countries are cracking down on how much of the soft drink can be served at one time. This is an attempt to limit the consumption of potentially dangerous chemicals.

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