

## **Energy Drinks and Health: A Brief Review of their Effects and Consequences**

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### **Resumen**

Las bebidas energizantes tan comúnmente promovidas como saludables en múltiples escenarios y subpoblaciones como lo son atletas y estudiantes universitarios pueden tener serios efectos adversos debido a sus ingredientes. Su consumo puede llevar a sufrir serias complicaciones incluyendo efectos adversos en el comportamiento. Este artículo presenta y discute, en forma breve, algunas implicaciones serias que pueden presentar estas bebidas, muy particularmente en términos de salud.

*Palabras Claves:* Bebidas energizantes, atletas, estudiantes universitarios

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### **Abstract**

Energy drinks have been promoted as a healthy beverage within many subpopulations, as for instance, athletes and college students. The chemical Composition of energy drinks can produce multiple adverse effects, including serious behavioral ones. This article presents and discusses, in a brief form, some serious health complications of energy drinks on their human consumers.

*Keywords:* Energy drinks effects, athletes, college students

Energy drinks became popular in Asia long before they reached the United States. In 1962, the Japanese pharmaceutical company, Taisho, released its Lipovitan D drink. It was designed to help employees to work hard well into the night hours. An Austrian businessman, Dietrich Mateschitz picked up on the business potential of energy drinks while on a trip to Asia. Along with two Thai business partners, Mateschitz started the company Red Bull GmbH, with the idea of marketing the drink to young Europeans. Miller (2008) has indicated that those drinks contain caffeine, taurine, vitamins, and usually sugar. They are generally marketed as capable of enhancing alertness or providing a short-term energy boost and do not constitute suitable sources of rehydration or restoration of electrolytes in association with athletic activity.

### **The Energy Drink Phenomenon**

Many clubs on the American West Coast got interested in the Red Bull phenomenon and began importing it to sell as a cocktail mixer. Many people mixed energy drinks with vodka or other alcohol substances to make a high-energy cocktail. Since alcohol is a depressant, it has a tranquilizing effect on the body that can make you unaware of how much you're drinking. One study found that men who

combined energy drinks with alcohol felt alert and sober, even though they were actually drunk (O'Brien, McCoy, Rhodes, Wagoner & Wolfson, 2008). And since both alcohol and energy drinks dehydrate you, when combined they can cause your body's fluids to drop to dangerous levels. In 1991, two people in Sweden, who drank alcohol with an energy beverage, died of dehydration, although it was never conclusively proved that the energy drink led to their deaths (O'Brien, et al., 2008).

Red Bull began distributing its drink in the United States in 1997. According to its manufacturer, revenues doubled each year, reaching more than \$1 billion in 2000 (Academy of General Dentistry, 2005). Although Red Bull has consistently been the leader in the energy drink market, several other companies have launched their own energy drink lines. Many of them are endorsed by celebrities.

Given the proliferation of energy drinks and their growing popularity, despite possible negative effects, educating students about the products is necessary. Energy drinks are aggressively marketed to college students with messages of improving performance and other benefits of consuming these beverages. Students are urged to consume energy drinks, usually due to peer pressure, and for the uninformed student, this may produce many negative consequences, as for instance over excitation and anxiety (Laquale, 2007).

While it is important to provide students with accurate information on energy drinks and caffeine as these affect athletic and mental performance, of greater concern should be the growing trend of combining energy drinks and alcohol. If alcohol is mixed with caffeinated energy drinks, the students are subjected to a double diuretic effect, since alcohol, like caffeine, has diuretic properties (Energy drinks' buzz may pose some risk, 2008). Thus, they further compromise hydration with the negative effects this may have in the cardiovascular and renal system (Marczinski, Fillmore, Henges, Ramsey & Young, 2012).

Moreover, energy drinks have the capacity to mask intoxicated feelings that allows increased alcohol consumption, which in turn increases the likelihood that a young drinker will make the kind of

choices that have negative, if not disastrous, results (Fornicola, 2007). Evidence suggests that energy drink consumption with and without alcohol remains on the increase, so educating on all aspects of energy drink consumption needs to become a priority, to ensure both wellness and safety (Marczinski, et al., 2012; O'Brien, et al., 2008).

### **Energy Drinks 101: Honest and Simple Knowledge from a Public Health Perspective**

The determination of what constitutes the best energy drink is whether the drink delivers the energy boost it promises with the fewer side effects. Taste also matters. If the drink is considered a good value and it's healthy, that makes it a better pick.

**Red Bull** introduced the energy drink craze to the U.S.; it is the best-selling energy drink in America. Nevertheless, Red Bull is made in Austria and then shipped around the world. Red Bull contains 27 grams of sugar, 80 mg of caffeine for the 8.3-ounce size, 1gram of taurine, 600mg of glucuronolactone and B vitamins, but no added herbal stimulants. Red Bull also makes Red Bull Sugar Free. The drink taste is similar to a weak beer with a lemony flavor.

**Monster Energy** is one of the best-selling energy drinks in the U.S. The taste and energy boost are similar to Red Bull, yet it comes in a can that is twice the size for about the same price. Monster Energy has 54 grams of sugars, 160 mg of caffeine and 2,000 mg of taurine. It has a sweet citrus taste. Monster also makes a variety of other flavors, including Monster Energy Lo-Carb but the energy effect takes longer to kick in with this version of the drink.

**No Fear** is a brand of clothing that partnered with Pepsi Co. to create an energy drink originally known as SoBe No Fear. In 2008, the SoBe name was dropped. No Fear Regular, gets mixed reviews for taste and energy. It has a fruit flavor taste with no jitter effects. No Fear contains 66 grams of sugar, 174 mg of caffeine and 2,000 mg of taurine per 16-ounce can. Now that Pepsi is distributing its own brand of energy

drinks (Amp Energy) and has just taken over the Rockstar brand from Coca-Cola, No Fear is not common to find.

**5-Hour Energy** scores well with reviewers for energy kick. 5-Hour Energy is packaged in 2-ounce shots, packing in an estimated 100 mg of caffeine per shot, or the equivalent of a cup of coffee, plus 2,000 percent of the daily value for vitamin B6 and 8,333 percent of the daily value of vitamin B12. 5-Hour Energy is sweetened with sucralose and contains zero net carbohydrates. 5-Hour Energy is not made with additional herbal stimulants, but it does contain amino acids and includes taurine. 5-Hour Energy is a little more than a shot of vitamins B6 and B12, amino acids, with caffeine. But unlike most energy drinks, 5-Hour Energy is a low-calorie drink (four calories). It comes in three flavors: berry, lemon-lime and orange. The company now produces 5-Hour Energy Decaf which contains a blend of B vitamins and only 6 mg of caffeine -- about as much as half a cup of decaffeinated coffee.

Among the top-selling brands, Rockstar, one 16-ounce can contains 160 mg of caffeine and 1,000 mg of taurine, as well as 62 grams of sugars, with guarana, ginseng and other herbal extracts as stimulants. It has a bubble gum aroma and a bland citrus flavor. The company has expanded from the original formula to offer other energy drinks including Rockstar Sugar Free Rockstar Zero Carb, and coffee flavored drinks called Rockstar Roasted, Rockstar Juiced and Rockstar Punched. Rockstar Punched that contains 240 mg of caffeine and 2,000 mg of taurine, along with 62 grams of sugars and herbal extracts (guarana, ginkgo, ginseng and milk thistle). Many of the different flavors of Rockstar are also available in 8-ounce and 24-ounce cans.

**FRS Healthy Energy Drink** even though it is not one of the three top energy drinks, the FRS healthy energy drink certainly can make it into the top five of this list of the ten best energy drinks. The main source of power for this particular energy drink is a substance that is known as quercetin. It is an ingredient from different fruits and vegetables that has been shown to increase energy production at the mitochondrial level.

Here is a list of the most common ingredients found in Energy Drinks.

1) **Caffeine** - It is probably the most common ingredient in energy drinks, as it acts as a stimulant. It is the main ingredient in common sodas such as Pepsi, Coke, Mountain Dew and coffee refreshments (Desbrow & Leveritt, 2007; Caffeine: Watch out for “energy drinks”, 2008). There is a very high content of caffeine in energy drinks. Most energy drinks contain around 100-200 mg of caffeine. This is why a lot of people feel the side effects of energy drinks, because the large amount of caffeine they contain. Caffeine works by blocking the effects of adenosine, a brain chemical involved in sleep (Academy of General Dentistry, 2005). When caffeine blocks adenosine, it causes neurons in the brain to fire. Thinking the body is in an emergency, the pituitary gland initiates the body's fight or flight response by releasing adrenaline. This hormone makes the heart beat faster and the eyes dilate. It also causes the liver to release extra sugar into the bloodstream for energy. Caffeine affects the levels of dopamine, a chemical neurotransmitter in the brain's pleasure center (Reissig, 2009). All of these physical responses make you feel with more energy. High levels of caffeine can be dangerous for people with high blood pressure or anxiety disorders.

2) **Taurine** - Taurine is a free form amino acid contained in foods and manufactured in the body from the amino acid cysteine. It is supposed to help energy levels throughout the body. Taurine could possibly help with stress levels as well. Because taurine is utilized by the body during exercise and in times of stress, it's become a popular ingredient in energy drinks. But taurine has a stimulating effect on the central nervous system that's very unnatural. Studies have implicated synthetic taurine in illnesses ranging from high blood pressure to strokes and seizures to heart disease (Reissig, 2009). For these reasons it's been banned in some Scandinavian countries, after being linked to the deaths of three consumers. Taurine works deep inside the brain in the regulatory area of the thalamus interacting with neurotransmitters (Malinauskas, 2006). The thalamus is involved in sleep/wake cycle pathways in the brain (Malinauskas, 2006).

3) **Guarana** - It is derived from South America in plant and is supposed to increase awareness and energy levels. Its effects can be compared to caffeine. (Ferreira, De Mello, Pompéia, & Oliveira de Souza-Formigoni, 2006).

4) **B Vitamins** - B Vitamins are co- factors of many enzymes involved in the generation of energy. (Ferreira, et al., 2006).

5) **Ginseng** - A herb that is known to increase energy levels and alleviate stress (Ferreira, et al., 2006).

6) **Ginkgo Biloba** - Along with ginseng, this is another herb with neurological effects. It is supposed to help memory concentration by increasing blood circulation. (Ferreira, et al., 2006).

7) **L-Carnitine** - Is an amino acid like substance and is supposed to help with your metabolism and energy levels. It speeds up your metabolism and increases energy levels. It is supposed to give you endurance as well (Agriculture and Agri-Food Canada, 2008).

8) **Sugars** - They are the body's main fuel but too much of it can get you hyperactive and energy drinks are loaded with them. They may also disrupt metabolic balance. (Brenner & Swanik , 2007).

9) **Antioxidants** - Molecules that inhibit the free radicals damaging species in your body (Higgins, Tuttle & Higgins, 2010).

Other less common compounds are Glucuronolactone, Beta-Phenylethylamine HCl, Evodiamine, Yohimbine HCL that may also have neurological effects (Chawla & Suleman, 2011; Babu, James & Lewander, 2008).

Given this list of ingredients, it is fairly easy to see that energy drinks are a deceptive combination of a soft drink and a psuedo-nutritional supplement. The largest problem with them is that people

tend to abuse them, drinking more than one at a time, or mixing them with alcohol.

A concern with the use of the herbs in these drinks is their source. The mass manufacturers of energy drinks are not required by law to list whether or not the herbs they use have been sprayed with toxic pesticides, irradiated or watered with contaminated water supplies, so there is no telling what other toxins are contained in these drinks and whether or not these herbs will have a negative physiological effect on the body.

The amount of caffeine found in energy drinks is also a problem. Not only is caffeine addictive, it acts as both a stimulant and a diuretic. As a stimulant, caffeine can make you suffer anxiety attacks, heart palpitations and insomnia (Cohen, 2008).

When consumed in large quantities, caffeine can also make you jittery or irritable. As a diuretic, caffeine causes your kidneys to remove extra fluid from your body (Cohen, 2008). If you consume energy drinks while sweating, this can be particularly dangerous because you can become severely dehydrated very quickly.

Many younger people have started mixing energy drinks with alcohol because it makes them feel alert and energetic, even when they are drunk (Miller, 2008). This can be dangerous because alcohol and caffeine dehydrate our bodies, especially after exercise such as a night of dancing (Energy drinks' buzz may pose some risk, 2008). There have been many instances, where energy drinks mixed with alcohol has caused severe dehydration.

Because so much additional research needs to be done on the other ingredients found in energy drinks, we recommend that the people who are at risk of having cardiovascular, renal or endocrinology conditions should avoid drinking energy drinks (Lofshult, 2008). The bottom line concerning energy drinks is that we simply do not know the long-term effects of consuming these beverages. It is known, however,

that large amounts of sugar and caffeine are harmful to our bodies. For people to utilize energy drinks during exercise or other strenuous activity increases the possibility of dehydration, and does nothing to provide the body with any necessary nutrients or fluids.

There are many alternative products that can provide an energy uplift, without the negative side effects of most energy drinks. Natural ginseng, ginko biloba and rhodiola all have proven stimulating effects within a security margin of action. B-Vitamins are also proven to be an excellent agent for energy and mental acuity (Williams, 2006). Also L- carnitine, Co-enzyme Q10 and alpha lipoic acid are safe alternatives (Williams, 2006). It is important to instruct persons in order to carefully read the labels of any product they choose to try. There are healthier alternative energy drinks that contain significantly lower, if any, carbs, sugars, and calories. Thus, it will be wisely to instruct people to read the nutritional label that are in all energy drinks in order that the person knows clearly the composition of the product.

### Conclusion

All of the popular energy drinks in the market have different variations of caffeine, and most of these drinks are not considered healthy for the human body. Most of these energy drinks should be watched carefully due to the unbalanced ingredients, especially sugar and caffeine in their compositions (Miller, 2008). Most energy drinks also stimulate and trigger reactions that can increase blood pressure, heart rate or alter glycemic levels. These can often prevent normal sleep cycles and dehydrate the body. Often times, the main reason why people turn to energy drinks is to obtain energy to perform school assignments, work outs tiredness or to finish job responsibilities. General public should not use energy drinks while exercising as the combination of all the stimulants and other ingredients in energy drinks can result in a loss of fluid from sweating, and cause severe dehydration and serious health problems (Scholey & Kennedy, 2004). Public health implications are definitively serious.

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