

### **Ethanol content in different energy drinks available in Bangladesh**

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At present, there has been an increase in the popularity of “energy drink” or “functional beverages”. They are also known as nutraceutical foods, which are substances considered to be a food or part of a food that may provide some health benefit (Villasenor *et al.*, 2002).

Socio-culturally, this country does not favor alcoholic beverages as drink. In the upper crust of society though, intake of liquid like this is not considered a vice. Then people newly acquiring wealth here are always in search of enjoyment. They view that their drinking habit will help overcome their class difference. Such pull and push within society however exert an extra pressure on the young generation to emulate their elders. But limited affordability compels them to lay their hands on cheaper varieties of drinks. Quite a few companies and business houses have taken a round-about path to cash in on the young people's gullibility. They are marketing a number of what is called energy drink.

Ethanol is commonly used in the formulation of beverages as a carrier for volatile and natural flavoring materials. Artificial flavoring may also contain ethanol. In situ fermentation is an unlikely source of ethanol because beverages and their ingredients are highly purified and sterilized (Macrae *et al.*, 1993). Ethanol can also be found in non-alcoholic beverages as an incidental additive for many flavouring and other agents. Also, the addition of small amounts of ethanol to a water-based beverage can lower the surface tension, allowing for some water soluble components, such as B-vitamins, to more readily dissolve into the solution. By federal statute, the ethanol content does not have to be reported or labeled on a beverage as long as the alcohol content remains less than 0.5% (w/v) (Goldberger *et al.*, 1996; Lutmer *et al.*, 2009; Stutsman, 1996).

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The market growth rate of energy drinks is very high in Bangladesh. However, the growth drift has some eccentricity. The market is mostly dominated by low-income segment. Now a days energy drinks are getting more popularity among the teenagers.

Goldberger *et al.* (1996) noted that certain common non-alcoholic beverages, including sodas and fruit juices, did in fact contain small amounts of ethanol, and they warned of the potential for these to adversely affect breath-alcohol results if they were consumed immediately breath test.

Consumed in moderation, alcohol has a number of beneficial effects but its misuse has detrimental effects affecting liver, gastrointestinal tract, cardiovascular, respiratory, nervous, endocrine, musculoskeletal, haemopoietic and urinary system etc. including fetus and newborn (Barclay *et al.*, 2008). Results from several large epidemiological studies have firmly established that heavy alcohol consumption is associated with a higher cancer incidence and mortality (Longnecker and Enger, 1996). Heavy metals in ethanol are another concern, since they are very hazardous to our health (Udota and Umoudofia, 2011).

Since ethanol has previously been found to be present in sufficient concentrations to cause a measurable mouth alcohol effect after the consumption of certain non alcoholic soft drinks (Logan and Distefan, 1998; Gullberg, 2007), this investigation was conducted to evaluate the ethanol content of some energy drinks now available in Bangladesh and their potential effect to produce inaccurate breath-alcohol result and also to make awareness among the people who are concern about ethanol.

Five available energy drink samples were collected from Saheb Bazar, Rajshahi and were marked as Brand-1, Brand-2, Brand-3, Brand-4 and Brand-5. The beverages were purchased from various confectionary stores of Saheb Bazar, Rajshahi. After collection, samples were preserved in refrigerator. In this experiment ethanol was estimated by redox titration where ethanol was oxidized to ethanoic acid by reacting with an excess of potassium dichromate in acid (Nakade, 2014).

The results of the ethanol content of the energy drinks are listed in Table-1. Name, serving size and measured ethanol contents are provided (Table 1). The ethanol content of the energy drinks ranged from 0.0218 to 0.0944 % (w/v).

**Table 1. Ethanol content of energy drinks**

Sl. No.	Name	Serving Size (ml)	Ethanol Content % (w/v)*
1	Brand-1	250	0.0218
2	Brand-2	250	0.0795
3	Brand-3	250	0.0656
4	Brand-4	270	0.0645
5	Brand-5	250	0.0944

\*average of three replications

In accordance with U. S. Food and Drug Administration, beverages containing less than 0.5% (w/v) ethanol are considered non alcoholic. If the ethanol content of a beverage is greater than 0.5% (w/v), it is considered an alcoholic beverage and must bear the government warning statement. In addition, if ethanol is added as an ingredient, it must be listed in the ingredient declaration. Finally, if the ethanol is present in insignificant quantities as an incidental additive, it may be exempt from labeling requirement. Of the energy drinks evaluated in this experiment, the ethanol concentrations were well below the maximum allowable limits of ethanol concentration as specified by the FDA, less than 1/40<sup>th</sup> the concentration commonly present in beer (3-5%). In this investigation, 1 of 5 (20%) energy drinks had ethanol concentration 0.0218% (w/v), 3 of 5 (60%) energy drinks had ethanol concentration above 0.060% (w/v) and the highest reported alcohol concentration was 0.094% (w/v), which are similar to other investigations (Logan and Distefano, 1998; Goldberger *et al.*, 1996; Lutmer *et al.*, 2009). Here Brand-1 had the lowest and Brand-5 had the highest concentration of ethanol.

As the ethanol level is very low in the investigated drinks, it would take considerable and unrealistic consumption levels to induce measurable blood alcohol concentrations. The recent consumption of certain energy drinks can give a slight but positive response on a breath alcohol test taken shortly after consumption. This is due to the mouth alcohol effect the beverages cause on the individuals consuming them. Any positive response on a breath-alcohol testing instrument still disappeared after a minimum 15-min observation period. Because these drinks do not contain enough alcohol to accumulate within a subject and cause a measurable blood alcohol content, the potential for a subject to have a measurable response on a breath alcohol test after an observation period is effectively nonexistent.

It is clear that if these energy drinks are consumed, the alcohol content of an ethanol-positive energy drink would not be physiologically significant. The amount of ethanol consumed from one container would be equivalent to about one sip of beer, and the corresponding peak blood ethanol concentration attained would not exceed 0.001% (w/v). In addition, operators of breath-alcohol testing devices must be cautioned regarding the innocent consumption of “nonalcoholic” beverages, such as flavored water, immediately prior to the breath test. Finally, the concentration of ethanol concentration should be well specified and should be mentioned on the labels. Except one energy drink, all the samples do not contain label expanding the nutrition fact panel including total fat, cholesterol, carbohydrates. Ethanol concentration may be included in this label which will be beneficial for all including persons concerning about ethanol and operators of breath-alcohol testing devices.

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