Adolescents, Sports Drinks and Energy Drinks: A Bad Mix?

Holly J. Benjamin, MD, FACSM, FAAP

Rethink Your Drink Symposium
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FINANCIAL DISCLOSURE:
No relevant financial relationship exists
Objectives

- To discuss the health impact of sugar sweetened beverages (SSB’s) on adolescents
- To review, in particular, the risks versus benefits of sports and energy drinks in the general youth population
- To identify strategies for education on the use versus misuse of sports and energy drinks in adolescents
What drinks are considered sugar sweetened beverages (SSB’s)?

- Sodas
  - Coke, Pepsi, Mountain Dew, Sprite, Dr. Pepper, Fanta
- Fruit Drinks (not 100% juice)
  - Kool Aid, Hi-C
- Iced Teas and Sweet Teas
  - Snapple, Arizona, Nestea, SoBe, Tazo
- Sports Drinks
  - Gatorade and Powerade
- Flavored Water
  - Vitamin Water

- Just one soda a day can add on up to 15 lb a year!
- NOTE: drinks that contain artificial sweeteners such as aspartame, sucralose or stevia are NOT considered sugary drinks but are SSB’s
Adolescent consumption**

- In 2004 adolescents consumed an average of 300 kcal’s/day from SSB
  - Approx 13% of total daily caloric intake
  - Approx 15 tsp of sugar a day
  - Since 2000; now independent of age, gender, racial/ethnic background and socioeconomic status
- SSB intake reduces consumption of important beverages such as water and nutrient rich milk
  - Calcium, iron, folate, vitamin A

What is a serving size?

<table>
<thead>
<tr>
<th>Amount</th>
<th>Sugar Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 oz</td>
<td>6 tsp</td>
</tr>
<tr>
<td>12 oz</td>
<td>8 tsp</td>
</tr>
<tr>
<td>20 oz</td>
<td>14 tsp</td>
</tr>
<tr>
<td>32 oz</td>
<td>23 tsp</td>
</tr>
<tr>
<td>46 oz</td>
<td>51 tsp</td>
</tr>
</tbody>
</table>
What is a serving size?

A standard serving size is 8 oz!

8 oz

46 oz
## Average CHO (carbohydrate) content of beverages

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Size</th>
<th>Avg CHO (tsp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>250 mL or 1 cup</td>
<td>0 tsp</td>
</tr>
<tr>
<td>1% milk</td>
<td>250 mL or 1 cup</td>
<td>3 tsp</td>
</tr>
<tr>
<td>Chocolate milk</td>
<td>250 mL or 1 cup</td>
<td>7 tsp</td>
</tr>
<tr>
<td>Unsweetened soy-beverage</td>
<td>250 mL or 1 cup</td>
<td>0 tsp</td>
</tr>
<tr>
<td>(Calcium &amp; Vitamin D fortified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flavoured soy beverage</td>
<td>250 mL or 1 cup</td>
<td>4 tsp</td>
</tr>
<tr>
<td>(Calcium &amp; Vitamin D fortified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% orange juice, unsweetened</td>
<td>250 mL or 1 cup</td>
<td>6 tsp</td>
</tr>
<tr>
<td>Fruit Flavoured beverage</td>
<td>250 mL or 1 cup</td>
<td>8 tsp</td>
</tr>
<tr>
<td>Diet pop, 1 can</td>
<td>355 mL or 1 ½ cups</td>
<td>0 tsp</td>
</tr>
<tr>
<td>Regular pop, 1 can (12 oz)</td>
<td>355 mL or 1 ½ cups</td>
<td>8 tsp</td>
</tr>
<tr>
<td>Sweetened Iced Tea (12 oz)</td>
<td>355 mL or 1 ½ cups</td>
<td>8 tsp</td>
</tr>
<tr>
<td>Sport drinks (12 oz)</td>
<td>591 mL or 2 1/3 cups</td>
<td>8 tsp</td>
</tr>
<tr>
<td>Iced Cappuccino (with milk)</td>
<td>312 mL or 1 ¼ cups</td>
<td>8 tsp</td>
</tr>
<tr>
<td>Ice slush</td>
<td>650 mL or 2.5 cups</td>
<td>12 tsp</td>
</tr>
<tr>
<td>Large fountain pop</td>
<td>1.9 L or 7 ½ cups</td>
<td>51 tsp</td>
</tr>
</tbody>
</table>
Nutrient composition of non-diet soda, OJ, and low-fat milk**

<table>
<thead>
<tr>
<th></th>
<th>Non-diet soda</th>
<th>Orange juice</th>
<th>1% milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories (kcal)</td>
<td>160</td>
<td>168</td>
<td>153</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>0</td>
<td>146</td>
<td>3</td>
</tr>
<tr>
<td>Vitamin A (IU)</td>
<td>0</td>
<td>291</td>
<td>750</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>0</td>
<td>33</td>
<td>450</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td>0</td>
<td>711</td>
<td>352</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>0</td>
<td>36</td>
<td>51</td>
</tr>
</tbody>
</table>

**Nestle M. Public Health Reports; 2000**
Health risks associated with SSB’s

- Obesity
- Diabetes (Type II)
- Cardiovascular disease
- Osteoporosis
- Hypertension
- Decreased bone density
- Dental decay
- Headaches
- Anxiety
- Sleep disturbances
Healthier Drink Guide

• Water, water, water

• AKA: voda, ama, das Wasser, nero, wai, maim, paani, mizu, mool, vanduo, woda, água, vasser, etc.
Water you would love to drink!
Healthier Drink Guide

- Water
  - At least $\frac{1}{2}$ your daily fluid intake should come from water (5 cups/day for kids and 10 cups for adults) minimum
- Skim milk, soymilk 1% lowfat milk
  - Approx 2 cups per day
- 100% fruit juice
  - 4 oz per day (small amounts)
Water Tips

- Kids should drink water routinely as initial beverage of choice
- Kids drink greater quantities of cooled beverages including water
- Add slices of fruit
  - Lemon, lime, watermelon
- Add small amounts of flavor such as fruit juice

Bar Or, O and Rowland T. *Pediatric Exercise Medicine*; 2004
Water

- Essential part of daily diet
- Body is 60% water
- Adequate hydration is needed to maintain normal cardiovascular, thermoregulatory and other physiologic body functions
- Goal is to maintain euvolemia
How much water does the body really need?

- Influenced by diet, meds, illnesses, chronic health conditions
- With exercise, needs increase quickly
  - Heat, humidity, sun exposure, acclimatization
  - Exercise time and intensity, sweat rates
Dehydration

• Caused by a mismatch between body water loss and water intake
• Dehydration is associated with
  – Fatigue
  – Impaired sports performance
  – Occasional electrolyte abnormalities
  – An increased risk of heat illness
• The presence of thirst indicates at least a 3% dehydration state
Sports drinks versus Energy drinks: Defining the difference

- "Sports drink" is a flavored beverage that contain carbohydrates (CHO), minerals, electrolytes (E), and sometimes vitamins or other nutrients (protein)
- "Energy drink" contains some form of stimulant substance(s) such as caffeine or guarana in addition to CHO, minerals, electrolytes, protein or AA’s

• Sports drinks are marketed to optimize athletic performance and replace fluid, CHO and E lost in sweat

• Energy drinks suggest a boost in energy, decreased fatigue, enhanced concentration and mental alertness
Stimulant containing energy drinks have NO place in the diets of children or adolescents!
Sports drink use

- Excessive caloric intake through use of a sports drink as a routine beverage can also contribute to the risk of pediatric overweight and obesity
- Calories range between 10-70 kcals/serving SD and 10-270 Kcals/serving for ED
- Studies show that adolescents do not distinguish differences between sports and energy drinks
- Reasons for use include good taste, quench thirst and extra energy boost
Sports drink consumption trends

- Between 1988-1994 and 1995-2004, the share of SSB consumption from sports drinks increased threefold among adolescents.

- Between 2000-2004, in schools, the purchase of traditional carbonated soft drinks fell 24% but sports drink sales increased 70% (almost 20% of total sales).
  - Ex: two 12 oz SSB servings at $0.50 a day costs $24 billion a year!!

**Wescott, et al. Measuring the purchases of soft drinks by students in US schools. An analysis for the ABA; 2010.**
Components of Sports Drinks

• Carbohydrate (CHO)
  – The body’s most important source of energy
  – Best ingested in regular diet balanced with protein and fat, not through CHO containing beverages
  – EXCEPTION: athlete who performs vigorous exercise for > 1 hr needs to replenish depleted glycogen stores as well as water and electrolyte loss**
  • Use of a CHO-E sports drink in this setting is recommended

Examples of Sports Drinks Content Per Serving (240 mL - [8 oz])**

<table>
<thead>
<tr>
<th>Product/Manufacturer</th>
<th>Kcal’s</th>
<th>CHO (g)</th>
<th>Na (mg)</th>
<th>K(mg)</th>
<th>Vitamins</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sport Body Quencher/All Sport, Inc.</td>
<td>60</td>
<td>16</td>
<td>55</td>
<td>60</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>All Sport Naturally Zero/All Sport, Inc.</td>
<td>0</td>
<td>0</td>
<td>55</td>
<td>60</td>
<td>B3, B5, B6, B12</td>
<td></td>
</tr>
<tr>
<td>Gatorade/PepsiCo, Inc.</td>
<td>50</td>
<td>14</td>
<td>110</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gatorade Propel/PepsiCo, Inc.</td>
<td>103</td>
<td>35</td>
<td></td>
<td></td>
<td>B3, B5, B6, B12, C, E</td>
<td></td>
</tr>
<tr>
<td>Gatorade Endurance/PepsiCo, Inc</td>
<td>50</td>
<td>14</td>
<td>200</td>
<td>90</td>
<td></td>
<td>Ca, Mg</td>
</tr>
<tr>
<td>Gatorade G2/PepsiCo, Inc</td>
<td>20</td>
<td>5</td>
<td>110</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powerade Zero/Coca-Cola, Co</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>25</td>
<td>B3, B6, B12</td>
<td></td>
</tr>
<tr>
<td>Powerade/Coca-Cola, Co</td>
<td>78</td>
<td>19</td>
<td>54</td>
<td></td>
<td>Iron</td>
<td></td>
</tr>
<tr>
<td>Powerade Ion4/Coca-Cola, Co</td>
<td>50</td>
<td>14</td>
<td>100</td>
<td>25</td>
<td>B3, B6, B12</td>
<td></td>
</tr>
<tr>
<td>Accelerade/Pacific Health, Inc.</td>
<td>80</td>
<td>15</td>
<td>120</td>
<td>15</td>
<td>E, Ca, Protein</td>
<td></td>
</tr>
</tbody>
</table>

Dental risks associated with sports and energy drinks

- Sports and energy drinks pH ranges 3-4 which is associated with enamel demineralization
- Citric acid is also highly erosive
- Bartlett, et al found enamel erosion in 57% of 11-14 yr olds in a cluster sample of adolescents
- This risk is independent of CHO content
Caffeine intake in youth and adolescents

• Sodas are the primary source of caffeine in a youth diet

• Ellison et al reported children 6-10 yrs old ingest caffeine 8/10 days

• Caffeine intake rises steadily with age and is over 60% in adolescent females and 70% in adolescent males
Caffeine ingestion

• Variety of forms
• Can increase aerobic endurance, strength, improve reaction time and delay fatigue in adults
• Effects variable and dose-dependent
• Not studied in children
Caffeine

Main side effects of Caffeine

Eyes:
- Blurred vision

Central:
- Drowsiness
- Decreased or increased hunger
- Thirst
- Anxiety
- Confusion
- Irritability
- Insomnia

Sense of balance:
- Dizziness

Mouth:
- Dryness

Skin:
- Flushing
- Cold sweats
- Pallor

Systemic:
- Hyperglycemia

Heart:
- Fast heartbeat

Muscular:
- Tremor

Gastric:
- Nausea
- Ache

Respiratory:
- Fruit-like breath odor
- Troubled breathing

Urinary:
- Increased urination
- Ketones in urine

Intestinal:
- Diarrhea

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Caffeine toxicity

- Ergogenic effects at 3-6 mg/kg. for avg 10 yr old 35 kg (80 lb)
  - 3 sodas (12 oz) 36 mg caffeine each (4.5 servings)
  - 1 Five Hour Energy (2 oz) 160 mg
  - 1 Monster Energy (20 oz) 160 mg/2.5 servings
  - Lethal dose => 200-400 mg/kg
  - In 2005, over 4600 calls reported to poison control centers for caffeine concerns and 2500+ involved persons under age 19**

Energy Blend 1870 mg**daily value not established

Taurine, glucuronic acid, malic acid, n-acetyl l-tyrosine, l-phenylalanine, **caffeine**, citrocoline

Regular, decaf or double shot??
• Athletes who eat wisely will perform better
• Athletes who don’t get the right “fuel” will run out of gas
• Energy needs vary
• This is true of non-athletes as well!!
Energy Balance

- Intake = Foods + fluids + supplements
- Expenditure = basal metabolism + thermic effect of food + physical activity
- Energy in = Energy out
School Vending Machine Recommendations

- Keep all vending machines off during regular school hours
- Keep machines off during lunch periods
- Prohibit sale of “foods of minimal nutritional value” during school hours
- Place vending machines in “out of the way” locations in schools (best if far from dining area)
- Discourage schools from depending on vending machine revenue to fund education
Do school bans lower SSB consumption?

- Taber et al found in longitudinal survey data from 6900 children in 5-8th grade**
  - 11 states that banned soda only
  - 7 states banned all SSB’s
  - 22 states without bans
- Consumption rates were lower when all SSB’s were banned
- If only soda was banned, other SSB’s were substituted so overall use constant
- Sadly, out of school consumption rates were unchanged in any situation

Take Home Points

- Energy drinks have NO PLACE in the diets of youths and adolescents
- Sports drinks add unnecessary calories to the diet and are forms of SSB’s
- Sports drink use is indicated only for high intensity workout situations of > 60 min
- Sports drinks erode dental enamel
- Sports drinks add unnecessary sodium to the diet
- WATER is adequate for most hydration needs
Thought for the Day

• “If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health.”

• Hippocrates
  (c. 460-377 B.C.)
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- Thank-you
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