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Increased Soft Drink Consumption is Contributing to an Increased Incidence of Obesity

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Introduction

Since the inception of the soft drink in the 1830's soft drink consumption has steadily increased with technological advances in production and increased product availability (1). Recent statistics from the United States Department of Agriculture reported a per capita increase in regular soft drink consumption from 28 gallons per person in 1986 to 41 gallons per person in 1997 (2). Increased regular, non-diet, soft drink consumption has been documented in pediatric and adolescent populations, and adolescents (13 to 18 years) specifically have increased the per day proportion of soft drink consumption by 74% for boys, and 64% for girls between 1977-79 and 1997 (2). High percentages of children and adolescents are currently regularly consuming soft drinks: 50.6% of preschool age children (2 to 5 years), 64.1% of school age children (6 to 12 years), and 82.5% of adolescents (3).

Regular consumption of soft drinks has negative consequences on the diet and health of children and adolescents. Regular soft drinks are made of 7 to 14% added sweetener, either sucrose or high fructose corn syrup, and constitute a significant portion of added sweetener in children and adolescent's diets (4, 5). The increased level of sweetener in regular soft drinks increases children's caloric intake and is a contributory factor in the development of pediatric and adolescent obesity (3, 6). Certain subsets of the pediatric and adolescent populations consume greater amounts of regular soft drinks, and specific education and policy approaches can be made to reduce soft drink consumption (3).

Soft Drink Consumption Contributes Significantly to Excessive Levels of Sweeteners in the Diet of Children and Adolescents

Regular soft drinks account for one third of the excessive amount of added sweeteners in the diets of children and adolescents (5). Due to the high amount of sweetener in regular soft drinks, regular soft drink consumption is in conflict with the 2000 US Dietary guidelines which suggest that Americans, "Choose beverages and foods that moderate your intake of sugars" (7). The US Department of Agriculture Food Guide goes further in defining recommended sugar intake levels by suggesting that sugar intake should be limited by energy needs. Specifically, sugar and sweetener intake should not exceed the difference between a person's energy needs and the amount of food, without sugar, that supplies the body's minimal energy levels. Using sample dietary patterns from the USDA that limited total added sweeteners, Guthrie and Morton calculated that added sweeteners should account for 6 to 10% of the energy in a person's diet (5).

The amount of added sweeteners in the diets of children and adolescents accounts for more of the percentage of consumed energy than the suggested 6 to 10%. Female and male adolescents (12 to 17 years) had the highest percentage of energy intake from sugars, 20.1% and 20.4% respectively, among any age group. Of the added sweeteners in the diet of adolescents, 37.1% in females and 40.7% in males came from regular soft drinks, and accounted for the largest single source of added sweeteners in their diets. In school age children (6 to 11 years) added sweeteners accounted for 18.9% of their total energy, and 21.9% of the added sweeteners were a result of regular soft drink consumption. In preschool age children (2 to 5 years) added sweeteners accounted for 15.9% of their total energy, and 14.6% of the added sweeteners were a result of regular

soft drink consumption. Preschool age children and older adults were the only groups in the Guthrie and Morton study for whom regular soft drinks were not the largest single source of added sweeteners in their diet. While preschool age children may receive less of their added sweeteners from regular soft drinks, sweetened beverages still account for a large amount of their sweetener intake, since 19.4% of sweeteners came from fruitades/drinks (5).

Soft Drink Consumption Contributes to Obesity

The US Dietary guidelines recommend that moderate levels of sugar and sweetener consumption for a reason. According to Guthrie and Morton the US Dietary guidelines promote moderate sugar intake because sugar promotes dental caries and many foods with sugar have a low nutrient density. When an excessive amount of high sugar low density foods are consumed it is difficult to consume a nutritious diet and not gain weight. It has been demonstrated that inferior caloric intake adjustments are made for carbohydrates consumed in liquid form compared to the solid form. Since increased consumption of carbohydrates in the liquid form is not adequately compensated for it is possible that total caloric intake could increase and lead to weight gain (5).

Harnack et. al. established that there was a significant difference in energy intake between children and adolescents who did not drink regular soft drinks and those that did drink regular soft drinks. Energy intake was significantly increased in preschool age children who drank soft drinks (50.6% of study participants), in school age children who drank more than 9 ounces/day of soft drinks (32.3% of study participants), and in adolescents who drank more than 26 ounces/day (22.2% of study participants) (3). Although Harnack, et. al. did not include measurements of obesity in their study, Ludwig, et. al. looked at sugar sweetened drinks consumption and body mass index (BMI) changes over a two year period. The study found that BMI and the frequency of obesity increased for each additional serving of sugar sweetened drink consumed. Children had 1.6 times increased risk of becoming obese for each serving of sweetened drink consumed daily. Although the Ludwig, et. al. study was observational and not experimental, the investigators made a significant effort to control for factors that influence obesity: diet (fat and fruit juice intake), physical activity, and time spent watching television and videos, in order to determine if an association existed between BMI and obesity and sugar sweetened drink consumption. Ludwig, et. al. supports the possible physiological mechanism, "...that consumption of sugar sweetened drinks could lead to obesity because of imprecise and incomplete compensation for energy consumed in liquid form." (6)

The 100% increase between 1980 and 1994 in the number of children and adolescents considered overweight is alarming and primarily attributable to an imbalance between energy intake and output (8, 9). Studies that have analyzed the increased incidence of obesity have focused on the mechanism of obesity, changes in dietary intake balance and physical activity levels. A significant amount of research has focused on the influence of high fat and energy dense foods, but little research has focused on the influence of sugar sweetened beverage consumption on obesity. Since regular soft drink consumption has been shown to increase caloric intake it may contribute significantly to caloric imbalance and lead to obesity. Obesity is a major public health problem that specifically increases

the number of cardiovascular disease factors and the risk of type II diabetes in children and adolescents (8). Reduced regular soft drink consumption should be a target in any effort to decrease the incidence of obesity in pediatric and adolescent populations.

Greater Amounts of Soft Drink Consumption in Specific Groups within the Pediatric and Adolescent Population

Certain subsets of the pediatric and adolescent population consume greater amounts of regular soft drinks and should be specifically targeted in any effort to reduce obesity levels. It has already been mentioned that a greater percentage of adolescents consume regular soft drinks than the percentage of children who consume regular soft drinks. Differences in regular soft drink consumption have also been established based on race, sex, and urbanization. White school age children and adolescents consume more regular soft drinks than their black counterparts. Among adolescents, males drink more regular soft drinks than females. Children and adolescents living in a large city, population greater than 50,000 people, also consume a greater amount of regular soft drinks than children and adolescents living in areas with less than 50,000 people (3). Additionally, education influences regular soft drink consumption and less regular soft drinks are consumed as the level of the mother's education increases (10, 11). Different regions of the country and the poverty status of the family were not found to be associated with regular soft drink consumption according to Harnack et. al. (3).

Strategies to Reduce Soft Drink Consumption

Schools should be a major target in efforts to reduce pediatric and adolescent regular soft drink consumption. Soft drink vending machines have been increasing on school campuses, and some schools have exclusive rights contracts with specific soft drink manufacturers. According to French, et. al, "Contracts often have written requirements about numbers of vending machines placed and required volumes of sales." Many contracts include specifications for increasing student soft drink consumption by, "...increasing the number of vending machines placed and or by increasing in-school advertising." (12). Contracts with soft drink companies are a source of revenue for schools, but have a negative effect on the nutrition and health of the students. Soft drink consumption in schools could be reduced if the sale of regular soft drinks was eliminated in school buildings.

The federal government has made an effort to limit the foods sold at schools by creating legislation in 1972 that allowed the USDA to regulate foods sold in schools that competed with federally funded school lunch programs. The legislation was amended in 1974 to allow unregulated sale of food whose profits went to school organizations or schools. With the amendment of 1974 vending machines on school campuses increased dramatically. Subsequently the federal government tried to regulate the sale of food with "minimal nutritional value," but was forced to relax regulation after lawsuits were filed by the National Soft Drink Association. Although specific regulation by the federal government over the sale of food in schools was reduced, the final legislation allowed state or local officials to set their own regulation on food sales. Since states and local

officials have the freedom to enact stricter regulation of food sold in schools, reductions in the availability of regular soft drinks at school are possible. (13)

Soft drink consumption could also be reduced by educating the public about healthy nutrition habits, and the importance of consuming beverages that moderate sugar intake. In contrast to the few educational service announcements that exist to educate the public about the importance of good nutrition, 549 million dollars were spent in 1997 on carbonated soft drink advertisements. The large amount of money spent by the soft drink industry on advertising was not spent in vain since studies have shown that heavily advertised foods are over-consumed relative to national dietary recommendations (12).

Conclusion

The increasing prevalence of obesity in the pediatric and adolescent population is troubling. Obesity is caused by a variety of factors, and research and policy has focused primarily on the influence of high fat foods and physical inactivity on the development of obesity. Beverage consumption is another component of the diet whose role has not been emphasized. Due to the high concentration of sweetener and the high amount of consumption among children and adolescents, the influence of regular soft drinks on the incidence of obesity deserves more attention in research and policy. Children and adolescents need to be educated about a healthy diet, and schools need to set an example by restricting sales to beverages and food that comply with USDA dietary recommendations. Regular soft drink consumption will continue to rise in the pediatric and adolescent population unless parents and children are targeted with education about the negative effects of regular soft drink consumption on nutrition and health.

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