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Knowledge, perceptions, and behaviors of adults concerning nonalcoholic beverages suggest some lack of comprehension related to sugars

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ABSTRACT

Key recommendations in the *2010 Dietary Guidelines for Americans* and US Department of Agriculture's MyPlate are to reduce the intake of added sugars, particularly from sugar-sweetened beverages, and drink water instead of "sugary" beverages. However, little is known about consumer knowledge, perceptions, and behaviors regarding sugars in beverages. We hypothesized that consumers would have limited or inaccurate knowledge of the sugars in beverages and that their beverage consumption behaviors would not reflect their primary concerns related to sugars in beverages. An online survey was completed by 3361 adults 18 years and older residing throughout the United States. Water was consumed in the highest amounts followed by (in descending amounts) other beverages (includes coffee and tea), added sugar beverages, milk, diet drinks, and 100% fruit juice and blends. Participants primarily associated the term "sugary" with beverages containing added sugars; however, almost 40% identified 100% fruit juice as sugary. Some participants misidentified the types of sugars in beverages, particularly with respect to milk and 100% fruit juices. Generally, beverage choices were consistent with stated concerns about total, added, or natural sugars; however, less than 40% of participants identified added sugars as a primary concern when choosing beverages despite public health recommendations to reduce the intake of added sugars and sugar-sweetened beverages. Results suggest that there may be a considerable level of consumer misunderstanding or confusion about the types of sugars in beverages. More consumer research and education are needed with the goal of helping consumers make more informed and healthy beverage choices.

1. Introduction

A key recommendation in the *2010 Dietary Guidelines for Americans* is to reduce the intake of added sugars, including from sugar-sweetened beverages (SSBs) [1], and the Institute of Medicine [2] and health organizations such as the American Heart Association [3] have advocated the same. Adult men and women consume approximately 550 and 320 kcal daily from beverages based on 24-hour intake, respectively [4]. Relative to other foods, SSBs such as soda, energy drinks, and

Abbreviations: ANOVA, analysis of variance; HFCS, high-fructose corn syrup; NHANES, National Health and Nutrition Examination Survey; SSB, sugar-sweetened beverage; USDA, US Department of Agriculture.

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sports drinks, collectively rank as the fourth highest contributor to mean energy intake in the American diet and contribute almost 36% of the added sugar intake in Americans 2 years and older [1]. In the 10-year period between 1988 to 1994 and 1999 to 2004, per capita consumption and SSB consumers' daily intake of SSBs increased by 46 kcal and 6 oz, respectively [5]. However, more recent data suggest that the intake of added sugars and SSBs has significantly decreased [6-8]. Based on National Health and Nutrition Examination Survey (NHANES) 2009-2010 data, SSBs accounted for an average of 155 kcal/d and 8% of daily energy intake in youth aged 2 to 19 years and 151 kcal/d and 6.9% of daily energy intake in adults aged 20 years and older [8]. Much of the decrease in SSB intake is accounted for by a decrease in the intake of regular soda and fruit drinks, whereas the intake of other SSBs such as energy and sports drinks has increased [7].

Research on the role of SSBs as a primary contributor to overweight and obesity is equivocal [9,10]. Based on published data from 1982 to 2004 and supplemented with 2004 to 2009 research findings, the 2010 Dietary Guidelines Advisory Committee concluded that there was strong evidence that greater intake of SSBs is associated with increased adiposity in children and that a moderate body of epidemiologic evidence suggests that greater consumption of SSBs is associated with increased body weight in adults [11]. A review included in the Nutrition Evidence Library of the US Department of Agriculture (USDA) concluded that a moderate body of evidence suggests that greater consumption of SSBs is associated with increased body weight in adults, but that under isocaloric conditions were no more likely to cause weight gain than other dietary energy sources [12]. Greater consumption of SSBs containing high-fructose corn syrup (HFCS) has been associated with other health issues including risk for type 2 diabetes in men [13], coronary heart disease in women [14], cardiometabolic risk [15], and elevated blood pressure [16].

Little is known about consumers' knowledge or perceptions of the types of sugars or sweeteners in beverages, their concerns about the sugars in the beverages they consume, and whether their behaviors regarding beverage consumption align with these concerns. According to the 2013 International Food and Information Council's Food & Health Survey [17], 58% of Americans say they are trying to limit or avoid sugars with 51% trying to specifically limit HFCS. However, 84% believe that moderate amounts of sugars can be part of an overall healthy diet, an increase of 22% over the previous year's finding. Currently, the Nutrition Facts panel lists total sugars and does not distinguish between added and natural sugars so consumers would have to read and understand the ingredients list to identify sources of added sugars in foods and beverages. A previous study suggested that food label claims on a hypothetical food product concerning added and total sugar content were not rated as important as other label claims, including those related to protein, sodium, saturated fat, fiber, or certain vitamins or minerals [18].

Consumer messages developed as part of USDA's MyPlate recommend drinking water instead of sugary drinks [19], so consumer perceptions of the beverages that they consider to be sugary drinks are important. Our research objectives were to determine the frequency of consumption of nonalcoholic beverages as well as knowledge and perceptions regarding the sugars contained in beverages and concerns related to the sugar content of beverages. Our primary hypothesis was that consumers would have limited or inaccurate knowledge of the sugars found in beverages. A secondary hypothesis was that consumers' beverage consumption behaviors would not reflect their primary concerns related to the sugars in beverages. We conducted an online survey of adults that was primarily designed to study perceptions of the healthiness of beverages based on various front-of-pack nutrition label designs [20]. We used a subset of the data collected to test our hypotheses.

2. Methods and materials

2.1. *Online survey and participants*

In March 2011, a sample of consumers in the United States, 18 years and older, was recruited to complete an online survey through a national survey panel hosted by Toluna. This survey was designed to study perceptions of the healthiness of beverages based on front-of-pack nutrition labels [20]. This project was reviewed and approved by the Institutional Review Board (IRB-02) at the University of Florida.

Online surveys hosted by panel companies have become more popular due to their low cost of administration and their ability to reach a significant percentage of the US population. As of May 2013, 85% of adults 18 years and older have access to the Internet [21]. Traditionally, telephone surveys were used to reach random samples of the US population. However, a recent study indicates that more than one-third of households (35.8%) rely completely on wireless telephones, which are typically excluded from telephone sample frames [22]. As a result, online panels have become more popular. However, no sample frame exists for email addresses similar to a telephone book; therefore, online panels rely on multiple recruitment methods to generate a sample population with demographics that reflect the target population. Panelists are recruited into the Toluna sample using a variety of methods, including Web banners, public relations, Web site referrals, and others. Panelists are validated using GeoIP and postal codes, double opt-in procedures, and the use of cookies to prevent duplication. Panelists for this survey were recruited from the panel that meet the criteria of being 18 years or older. In addition to Toluna's panel quality control, a validation or "trap" question was used in our survey to ensure that panelists were carefully reading questions (respondents were asked to respond to a particular question with a specific answer; those who did not answer as instructed were excluded from the survey). One drawback of using Internet panels is the volunteer nature of recruiting panelists, allowing no basis to calculate sampling error. Instead, a completion rate is typically calculated based on those that enter the first question of the survey compared with those that complete the survey.

The survey consisted of 60 questions including demographic, dietary, and psychosocial information as well as beverage consumption habits; nutrition, health, and food concerns; perceptions of sugar types and content in various beverages; food package label use; and general nutrition and