Research on Sugar Control Management Behavior and Influencing Factors Among College Students: A Case Study of a University in Guilin

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Abstract. Objective: The field of healthy diet is a crucial aspect of health management. This study, based on the Health Belief Model, conducted a cross-sectional survey among college students in Guilin to explore their current high-sugar diet behaviors, analyze the influencing factors, and investigate their knowledge, attitudes, and perceptions regarding high-sugar diets. Methods: A simple random sampling questionnaire survey was conducted among students from five grades at a university. Data were entered into Excel 2010 and analyzed using SPSS 26.0. Descriptive statistics were used to summarize the current status of sugar control knowledge, attitudes, and behaviors. Chi-square tests and ANOVA were employed for statistical analysis, with a significance level of $\alpha=0.05$ ($p<0.05$ considered statistically significant).Results: Significant differences were observed in sugar control knowledge, attitudes, and behaviors based on gender, family residence, family history of diabetes, and sleep duration. Specifically, students with less than 6 hours of sleep and those with a family history of diabetes showed notable differences in sugar intake. Female students exhibited stronger attitudes toward sugar control compared to males. Overall, college students' knowledge and beliefs regarding high-sugar diets, as well as their understanding of the associated risks, were relatively low, indicating a need for enhanced health education on sugar control. Conclusion: Strengthening education on sugar control and health risks is essential to improve college students' health literacy regarding healthy sugar intake. This will help prevent diet-related diseases such as diabetes and dental caries.

Keywords: College students, Sugar control, Influencing factors

1 Introduction

In recent years, the relationship between sugar intake and adverse health effects has garnered significant attention. The World Health Organization (WHO) reports that the primary diseases affecting human health have shifted from infectious diseases to chronic non-communicable diseases. This shift is closely related to advancements in

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medical technology, changes in population structure, and imbalanced dietary patterns, particularly high-sugar, high-energy, and high-fat diets[1].

Added sugars, which are sugars and syrups added during food production and preparation, are a major source of dietary sugar, excluding naturally occurring sugars in foods[2]. These added sugars primarily come from processed foods such as sugary beverages, pastries, biscuits, desserts, ice creams, and candies. In the United States, soft drinks and fruit juices account for 42.7% of added sugar intake. Sugary beverages (SSBs) are particularly recognized as a major source of added sugars, posing significant health risks to young people[3]. Research suggests that daily sugar intake should be limited to 25 grams, and weekly sugary beverage consumption should not exceed 355 milliliters[4]. The WHO's 2020 nutritional guidelines recommend that adults limit their added sugar intake to less than 5% of total energy intake, approximately 25-30 grams per day. Excessive sugar consumption can lead to various health issues, including hypertension, coronary heart disease, type 2 diabetes, obesity, kidney disease, non-alcoholic fatty liver disease, dental caries, and gout[2].

In response to the public health impact of excessive added sugar consumption, many countries have implemented policies to limit sugary beverage consumption. For example, the UK government has imposed a "sugar tax" on beverages containing more than 5 grams of sugar per 100 milliliters, with similar measures adopted in Ireland and Estonia[5]. China's "Healthy China 2030" plan emphasizes the importance of promoting healthy lifestyles nationwide. In 2019, excessive sugary beverage consumption contributed to 46,000 deaths in China, a 95% increase compared to 1990.

The Dietary Guidelines for Chinese Residents (2022) recommend that adults limit their daily added sugar intake to no more than 10% of total energy intake, ideally less than 5%, or no more than 50 grams per day, preferably below 25 grams. The State Council's "Healthy China Action (2019-2030)" includes the control of oil, salt, and sugar intake as specific evaluation indicators. However, compared to the extensive epidemiological research and intervention practices on risk factors such as oil and salt, studies on sugar intake in China remain relatively limited[6].

2 Method

2.1 Sample Source

The study surveyed college students from a university in Guilin. A total of 378 questionnaires were distributed, with 14 excluded due to incomplete or abnormal responses, resulting in 364 valid questionnaires (96.29% response rate). Among the respondents, 51.6% were female, and the distribution across grades was as follows: freshmen (13.7%), sophomores (14.3%), juniors (20.9%), seniors (28.6%), and fifth-year students (22.5%). In terms of family residence, 23.1% were from urban areas, 47.0% from towns, and 29.9% from rural areas.

2.2 Research Methods

The study used Hedrick's BEVQ-15 scale to measure high-sugar diet behaviors, which assesses the frequency and quantity of sugary beverage consumption per week. The sugar control knowledge questionnaire was based on the food frequency method from public health research. Participants were asked about their sugary beverage consumption in the past week, with response options ranging from "almost never" to "more than 7 times per week." Excessive intake was defined as consuming sugary beverages more than twice per week[7]. The sugar reduction behavior was defined as "choosing beverages with less than full sugar."

The knowledge dimension included questions such as "I understand the concept of a high-sugar diet," "I know the harms of a high-sugar diet," and "I am aware of the differences between sugar, free sugars, and added sugars." A 5-point Likert scale was used, with higher scores indicating stronger knowledge. The Cronbach's Alpha coefficient for this dimension was 0.854, indicating good reliability.

The attitude dimension assessed participants' perceptions of high-sugar diets, including statements like "I believe long-term high-sugar diets are harmful to health" and "I think sugar control is necessary." The Cronbach's Alpha coefficient for this dimension was 0.798.

The behavior control dimension evaluated participants' actions to control sugar intake, such as reading food labels and estimating daily sugar consumption. The Cronbach's Alpha coefficient for this dimension was 0.793.

Self-efficacy was measured using a scale adapted from Corner et al. (2001), which included items such as "Important people in my life support my efforts to reduce sugary food intake." The Cronbach's Alpha coefficient for this dimension was 0.721.

2.3 Quality Control

The reliability of the questionnaire was tested using Cronbach's Alpha, with a coefficient of 0.891, indicating high reliability. The validity was confirmed through exploratory factor analysis, with a KMO coefficient of 0.906 ($p<0.001$).

2.4 Statistical Methods

Data were analyzed using SPSS 26.0. Descriptive statistics were used for qualitative data, and chi-square tests were employed to compare groups. Multivariate logistic regression was used to assess the impact of knowledge, attitudes, and behavior control on excessive sugar intake. The significance level was set at $\alpha=0.05$.

3 Result

3.1 Descriptive Statistics of Sugar Control Knowledge

The results that students' knowledge of sugar control and its harms was moderate. The lowest score was for knowledge of the recommended daily sugar intake (mean=3.23±1.145). Awareness of the harms of high-sugar diets was higher than knowledge of added and free sugars.

3.2 Descriptive Statistics of Sugar Control Attitudes

Overall, students had positive attitudes toward sugar control, but the lowest score was for the belief in maintaining sugar control habits (mean=2.96±1.16)

3.3 Descriptive Statistics of Sugar Control Behaviors

The highest scores were for actively seeking sugar control knowledge (mean=3.07±0.94) and calculating total sugar intake (mean=3.07±0.97). The lowest score was for estimating sugar content in foods (mean=2.81±0.95)

3.4 Correlation Analysis of Knowledge, Attitudes, and Behaviors

Significant positive correlations were found between knowledge, attitudes, and behaviors ($r=0.714$, 0.481, and 0.390, respectively).

3.5 Characteristics of Excessive Sugar Intake

Male students were more likely to consume excessive sugary beverages than female students ($\chi^2=37.906$, $p<0.001$). Body mass index (BMI), sleep duration, and family history of diabetes were also significant factors influencing sugar intake.

4 Discussion

The study found significant positive correlations between knowledge, attitudes, and behaviors, supporting the application of the Knowledge-Attitude-Practice (KAP) model in sugar control behavior change. Gender differences were notable, with male students more likely to consume excessive sugary beverages, possibly due to differences in dietary habits and lifestyles. BMI and sleep duration were also associated with excessive sugar intake, reflecting the impact of lifestyle on dietary behaviors. Students with a family history of diabetes exhibited better sugar control behaviors, likely due to their heightened awareness of disease risks[7]. The primary sources of sugar control knowledge for college students were social media, school education, and magazines[8]. Therefore, health education campaigns should leverage online

platforms to disseminate sugar control knowledge effectively. Students from urban areas had more positive attitudes toward sugar control compared to those from rural areas, possibly due to differences in health awareness and access to resources[9].

To improve sugar control behaviors among college students, targeted interventions should focus on enhancing health literacy, promoting healthy dietary habits, and addressing lifestyle factors such as sleep and physical activity[10]. Educational programs should emphasize the risks of excessive sugar intake and provide practical strategies for reducing sugar consumption.

5 Conclusion

This study found that female students accounted for a relatively high proportion of the sample, and upperclassmen showed greater concern for health issues. The distribution of family residences revealed urban-rural disparities, which may influence health awareness and sugar control behaviors. Most students lacked sufficient knowledge about appropriate sugar intake levels, indicating a need to strengthen the dissemination of nutritional knowledge at the educational level. Although students generally recognized the importance of sugar control, their self-efficacy was inadequate, which may hinder their ability to maintain long-term sugar control behaviors. Students performed poorly in practical sugar control behaviors, particularly in estimating the sugar content of foods and managing total sugar intake. The positive correlations among the three dimensions of knowledge, attitudes, and behaviors suggest that improving students' understanding of sugar control and fostering positive attitudes can promote better sugar control behaviors. Gender, BMI, sleep duration, and family history of diabetes were identified as significant factors influencing college students' sugar control behaviors. Male students and those with a family history of diabetes were more likely to over consume sugar-sweetened beverages. Female students, upperclassmen, and those with a family history of diabetes demonstrated better knowledge of sugar control. Residence location and sleep duration also had significant impacts on attitudes and behaviors related to sugar control. Based on the findings, the following measures are recommended to improve college students' sugar control behaviors: strengthen nutrition education, particularly regarding appropriate sugar intake levels; adopt the Knowledge-Attitude-Practice (KAP) model in health education to enhance students' knowledge and positive attitudes; design targeted health education programs for students of different genders and grades; encourage students to participate in physical activities to promote a healthy lifestyle; and provide additional support and resources for students with a family history of diabetes. In summary, this study highlights the issues in college students' knowledge, attitudes, and behaviors regarding sugar control and proposes targeted recommendations to promote healthy dietary habits, reduce added sugar intake, and improve overall health. Future research should include students from other universities and young adults outside the college environment to provide broader perspectives and enhance the representativeness of findings for this age group.

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Author contributions

J.W.L is the corresponding author. S.Y.H. conceived the study idea. S.Y.H. and J.W. conducted the experiments and wrote the manuscript.

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