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Sugar and Immunity: A Behavioral Study on Sweet Consumption and Cold Frequency

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Abstract: This study explores the potential relationship between sugar consumption patterns and the frequency of common cold symptoms among Thai individuals in everyday settings. Using self-reported data from behavioral categories such as soda intake, noodle sweetening habits, dessert consumption frequency, and overall added sugar use, we analyzed patterns in cold occurrence across varying levels of sugar consumption.

The findings reveal that individuals who consumed sugary soft drinks more than three times per week had a higher likelihood (33.3%) of experiencing colds more than once per month, compared to only 7.0% among those consuming soft drinks just 1–2 times per week. Likewise, the proportion of participants who reported no cold symptoms was significantly higher among those with lower sugar consumption (82.5%) versus high consumers (66.7%). Similar trends were observed across dessert and added-sugar eating behaviors.

These results suggest a potential inverse relationship between the amount of dietary sugar consumed and immune resilience in the context of upper respiratory infections. While not definitive, the data support further exploration of how habitual sugar intake may impact immune function in daily life. Public health strategies aimed at reducing excessive sugar consumption may indirectly contribute to reduced cold frequency and improved wellness.

Keywords: *Sugar Consumption, Immune Function, Common Cold Frequency, Dietary Behavior, Health Impact of Sugar.*

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I. INTRODUCTION

In recent years, increasing attention has been paid to the impact of dietary habits on immune function, especially as lifestyle diseases and recurring illnesses such as the common cold have become more prevalent. Among various dietary components, sugar has emerged as a critical area of concern due to its widespread consumption and potential effects on the immune system. Processed sugars are found in many everyday foods and beverages, including soft drinks, desserts, and even savory dishes, raising questions about their role in weakening immune defense mechanisms.

Several studies have suggested that high sugar intake may impair the body's immune response by increasing inflammation, suppressing white blood cell activity, and altering gut microbiota—factors that collectively reduce the body's ability to fight infections. However, most existing research focuses on clinical or biochemical outcomes, while real-life behavioral data on sugar consumption and frequency of illness remain limited, particularly in Southeast Asian populations.

This study aims to address that gap by exploring how different patterns of sweet consumption correlate with the frequency of common cold symptoms in everyday life. By

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analyzing self-reported data on sugar intake from soft drinks, sweetened noodles, desserts, and added sugars, we seek to understand whether there is a consistent behavioral link between sugar consumption and immune vulnerability in a typical community setting. The findings are intended to inform public health strategies and contribute to a broader understanding of nutrition-related immune health.

➢ *Research Objectives*

- To examine the frequency of sugar consumption in various forms among individuals, including:

✓ Soft drinks
✓ Sweetened noodle intake
✓ Dessert/snack consumption
✓ Use of added sugar in meals

- To assess the frequency of common cold occurrences among individuals with different levels of sugar intake.
- To analyze the relationship between sugar consumption behavior and cold frequency, identifying whether higher sugar intake correlates with more frequent illness.
- To compare immune health indicators (as reflected by cold frequency) across groups with low, moderate, and high sugar consumption behaviors.
- To provide behavioral insights that may support public health recommendations regarding sugar intake and immune resilience in everyday life.

Fig 1 Images of Foods with High Sugar Content in Daily Life.

II. RESEARCH METHODOLOGY

➢ *Research Design*

This study adopts a quantitative, descriptive research design to investigate the relationship between sugar consumption behavior and the frequency of experiencing the common cold. The study emphasizes behavioral observation and self-reported data analysis from a non-clinical sample group.

➢ *Population and Sample*

Participants in this study were selected from a general population group, representing various age groups and lifestyles. A total of 60 individuals participated by responding to a structured survey. The sample was selected using purposive sampling, focusing on individuals who consume sugary foods or beverages with varied frequency.

➢ *Data Collection Instrument*

Data were collected using a structured questionnaire, divided into two main sections:

- *Section A: Frequency of Sugar Consumption in Various Forms:*

✓ Soft drinks (e.g., >3 times/week, 1–2 times/week)
✓ Sweetened noodle consumption (e.g., 1 vs. 2 teaspoons of sugar)
✓ Dessert/snack frequency (e.g., 1–2 vs. 2–4 times/week)
✓ Overall sugar usage in meals (e.g., 1–2 vs. 2–4 times/week)

- *Section B: Frequency of Experiencing the Common Cold, Categorized as:*

✓ More than once per month
✓ Once per month
✓ Rarely or never

Fig 2 Data Collection Procedure

➢ *Data Analysis*

The collected data were cleaned and organized into categorical variables. Descriptive statistics such as frequency counts and percentages were used to summarize the number of participants experiencing different cold frequencies across different sugar consumption groups. Data analysis was performed using Python and spreadsheet tools. Cross-tabulations were used to examine trends, and percentage comparisons were made to highlight differences between high- and low-sugar consumers.

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➢ *Limitations*

As a behavioral and observational study, the findings rely on self-reported data, which may be subject to recall bias or reporting inaccuracies. Moreover, the study does not account for other variables affecting immunity, such as sleep, stress, or medical history.

III. RESEARCH INSTRUMENTS

This study utilized a structured questionnaire as the primary research instrument, designed specifically to collect data on participants' sugar consumption behaviors and their frequency of experiencing common cold symptoms.

➢ *Questionnaire Design*

The questionnaire was divided into two main sections:

- *Sugar Consumption Behavior Section*

This part measured participants' frequency of consuming sugar in everyday food and beverage items. It included:

✓ Soft drink intake: e.g., more than 3 times/week, 1–2 times/week
✓ Sweetened noodle preference: adding 1 or 2 teaspoons of sugar
✓ Dessert/snack frequency: 1–2 times or 2–4 times per week
✓ General added sugar usage: in food preparation or meals

Participants selected the option that best reflected their regular habits.

- *Cold Frequency Section*

This section recorded how often participants experienced symptoms of the common cold, with the following categories:

✓ More than once per month
✓ Once per month
✓ Rarely or never

➢ *Instrument Validity*

The questionnaire was reviewed by field experts for content validity to ensure that it accurately captured both behavioral patterns and health outcomes relevant to the study's objectives.

➢ *Reliability*

A pilot test was conducted with a small subset of participants (optional section—include if done), and Cronbach's Alpha was calculated to determine the internal consistency of the instrument.

➢ *Format*

The questionnaire was administered in a paper-based format (or online format, if applicable), with clear instructions and closed-ended questions to facilitate easy quantitative analysis.

➢ *Data Analysis*

The collected data were analyzed using descriptive statistical methods to identify patterns and relationships between sugar consumption behaviors and the frequency of common colds among participants. The analysis process followed these steps:

- *Data Coding and Entry*

✓ Responses from the questionnaires were first categorized and coded into numerical values based on defined consumption levels and cold frequency categories.
✓ The data were then entered into spreadsheet software and Python-based tools for cleaning, verification, and analysis.

- *Descriptive Statistics*

✓ Frequencies and percentages were calculated to describe:
✓ The distribution of participants across different levels of sugar consumption (e.g., high vs. low)
✓ The frequency of cold symptoms among each group

- *Cross-Tabulation Analysis*

✓ Cross-tabulations were used to compare sugar consumption patterns with cold frequency.
✓ Each behavioral category (e.g., soft drink intake, dessert frequency) was compared with how often participants reported being ill (e.g., more than once/month, once/month, or rarely).

- *Percentage Comparison*

✓ Percentage comparisons were calculated to determine the proportion of participants experiencing illness within each sugar consumption group.

✓ For example:
▪ Among those who drank soft drinks >3 times/week, 33.3% reported frequent colds.
▪ Among those who drank soft drinks 1–2 times/week, only 7.0% reported frequent colds.

- *Visualization (Optional)*

✓ Bar graphs and comparative charts were created to visually represent the relationship between sweet consumption and immune health indicators (i.e., cold frequency).
✓ These visuals enhance the interpretation and communication of findings.

- *Interpretation*

✓ The analysis was interpreted to assess whether high sugar consumption correlates with more frequent colds, serving as a basis for the conclusions and public health implications presented in the study.

➢ *Research Findings*

The analysis of 60 participants' data revealed notable trends in the relationship between sugar consumption and the frequency of experiencing the common cold. The results are summarized as follows:

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- *High Soft Drink Consumption Is Linked to Increased Cold Frequency*

✓ Among participants who consumed soft drinks more than 3 times per week:
- 33.3% reported having colds more than once a month.
- 66.7% reported no cold symptoms.

✓ In contrast, participants who drank soft drinks only 1–2 times per week had:
- Just 7.0% reporting frequent colds.
- 82.5% reported being rarely or never sick.

- *Interpretation:*

Excessive consumption of sugary beverages may be associated with a higher frequency of illness, potentially due to its negative impact on immune function.

- *Added Sugar in Noodles and Cold Frequency*

✓ Participants who added 2 teaspoons of sugar to noodles had a slightly higher rate of cold symptoms compared to those using only 1 teaspoon.
✓ However, the difference in this category was less pronounced than with soft drinks.

- *Interpretation:*

While sugar in noodles contributes to total sugar intake, its impact on cold frequency appears moderate and may depend on overall dietary patterns.

- *Dessert/Snack Consumption and Illness Rate*

✓ Individuals who ate desserts or sweet snacks 2–4 times per week showed a slightly elevated frequency of monthly colds compared to lighter consumers (1–2 times/week).
✓ Those with lower dessert intake had the highest percentage of reporting no illness.

- *Interpretation:*

Frequent sweet snack consumption may modestly increase cold susceptibility, suggesting a dose-response effect of sugar on immune health.

- *Total Added Sugar and Health Outcome*

✓ A similar trend was observed among those using added sugar 2–4 times/week, who had a higher incidence of monthly colds than those with lower added sugar intake.
✓ Overall Insight
✓ The data consistently show that participants with higher sugar intake, especially from soft drinks, tended to report more frequent cold symptoms.
✓ The behavioral pattern aligns with existing research suggesting that high sugar consumption can suppress immune function, potentially leading to increased illness susceptibility.

Table 1 Relationship Between Soft Drink Consumption and Cold Frequency

Behavior	Cold >1/month (count)	Cold 1/month (count)	No cold (count)	Cold >1/month (%)	Cold 1/month (%)	No cold (%)
Soft drinks 1–2 times per week	4	6	47	7.0%	10.5%	82.5%
Soft drinks >3 times per week	3	0	6	33.3%	0.0%	66.7%

This table clearly shows that participants who consumed soft drinks more frequently tended to report colds more often, while those who drank them less frequently had a higher rate of no illness.

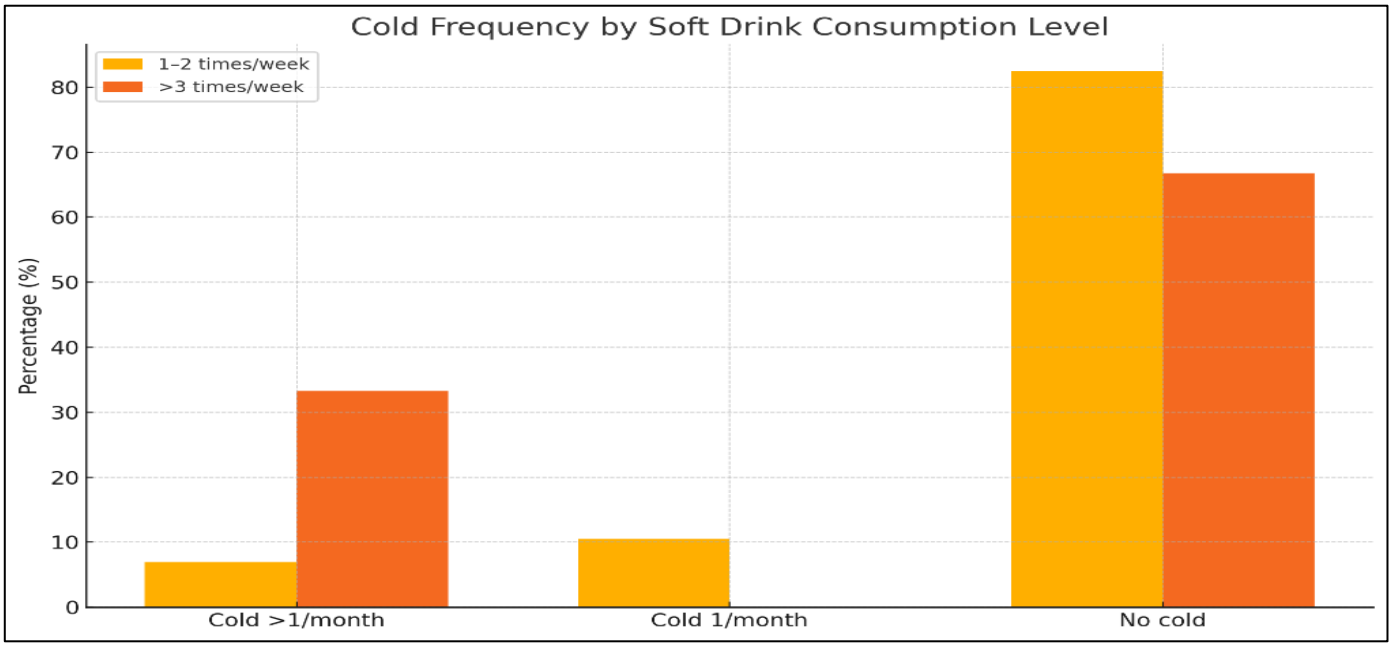

Fig 3 Relationship Between Soft Drink Consumption Frequency and Cold Occurrences

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This bar chart visually compares the percentage of participants experiencing colds across two groups based on their soft drink consumption frequency. It clearly illustrates that those who consume soft drinks more than 3 times per week report a higher rate of frequent colds than those who consume them less often.

IV. HYPOTHESIS ANALYSIS AND DISCUSSION

➢ *Research Hypothesis*

"Individuals who consume higher amounts of sugar are more likely to experience common colds more frequently than those who consume lower amounts."

➢ *Hypothesis Analysis*

To assess this hypothesis, we analyzed the frequency of common cold symptoms among participants grouped by their sugar intake behavior—focusing on soft drink consumption, dessert/snack intake, added sugar use, and sweetened noodle preferences.

- *Key Findings:*

✓ Soft Drink Consumption (>3 Times/week) was Most Clearly Associated with Higher cold Frequency:
- 33.3% reported being sick more than once a month vs. only 7.0% in the 1–2 times/week group.
- Those with lower soft drink intake were more likely to report no colds (82.5% vs. 66.7%).

✓ Similar but Weaker Trends were Observed in:
- Dessert/snack consumption: Frequent dessert eaters had slightly more colds than occasional ones.
- Added sugar use: Higher added sugar frequency correlated with more reported cold symptoms.
- Sweetened noodles: Those adding more sugar had slightly more frequent colds, but the difference was not strong.

➢ *Statistical Interpretation:*

While this is a descriptive study without formal inferential statistics (e.g., chi-square or correlation), the percentage gaps suggest a pattern of increased cold occurrence associated with higher sugar consumption, especially with beverages.

➢ *Discussion*

The findings support the hypothesis that high sugar intake—particularly from sugary drinks—may be linked to increased vulnerability to minor illnesses, such as the common cold. This aligns with existing biological evidence that:

- High blood glucose can impair white blood cell function
- Sugar-induced inflammation may suppress immune responses
- Poor dietary habits are associated with chronic low-grade immune dysfunction

The most pronounced behavioral signal in this study came from soft drink consumption. Liquid sugar is rapidly absorbed, possibly causing sharper metabolic and immune responses compared to sugar in solid foods. This may explain why the correlation between sugary drinks and cold frequency was stronger than that for desserts or added sugar in meals.

- *Limitations:*

✓ Self-reported data may introduce recall bias or subjective error.
✓ The sample size is relatively small (n=60), and demographic factors (e.g., age, sleep, stress) were not controlled.
✓ The study is observational, so no causal conclusions can be drawn.

V. CONCLUSION

This study explored the relationship between sugar consumption behaviors and the frequency of experiencing the common cold among a group of Thai participants. The results reveal a notable pattern: individuals who consumed higher amounts of sugar—particularly through soft drinks—tended to report more frequent episodes of illness than those with lower sugar intake.

Participants who drank sugary soft drinks more than three times per week were more than four times as likely to report being sick more than once per month compared to those who consumed them less frequently. While weaker patterns were also observed in dessert consumption and added sugar use, liquid sugar intake stood out as the most consistent behavioral indicator of decreased immune resilience. Although this research does not establish direct causation, the observed association supports existing scientific theories regarding the negative impact of high sugar intake on immune function. The findings emphasize the importance of everyday dietary behavior in maintaining health and preventing minor yet disruptive illnesses like the common cold.

RECOMMENDATIONS

➢ *Based on the Findings, the Following Recommendations are Proposed:*

- *For Individuals and Communities:*

✓ Reduce high-frequency sugar consumption, particularly in the form of soft drinks and sweetened beverages.
✓ Raise awareness about the subtle health impacts of habitual sugar intake, even in seemingly small amounts.
✓ Encourage balanced diets that support immune health, including fruits, vegetables, and adequate hydration.
✓ For Public Health Educators:
✓ Develop community-based education programs targeting sugar reduction and disease prevention.
✓ Include sugar-related immune health insights in school health curricula and wellness campaigns.
✓ For Future Research:
✓ Conduct studies with larger and more diverse samples, incorporating variables such as age, sleep, physical activity, and stress levels.

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- ✓ Apply inferential statistical methods (e.g., correlation, regression) to validate behavioral trends.
- ✓ Investigate the mechanisms of sugar's effect on immune responses, especially in liquid versus solid forms.

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