Factors Associated with Dietary Behavior Leading to Tooth Decay in Children Aged 10-12 Years

Kornchanok Muangsiri[1]
[1]Shrewsbury International School Bangkok,
j.muangsiri24@gmail.com,
Patraporn Ekvitayavetchanukul[2]
[2] Patnada-Wellness, Thailand
[2]Email: dr.patraporn.ek@gmail.com

Abstract
This descriptive research aimed to investigate the levels of knowledge, attitudes, and dietary behaviors that contribute to the development of dental caries, as well as the factors associated with dietary behaviors influencing dental caries (Ponpanumas, S., 2015) in primary school students in Nonthaburi province. The sample consisted of 200 primary school students aged 10-12 years, selected through stratified random sampling. Data were collected using a four-part questionnaire, which included general information, knowledge about food consumption, attitudes toward food consumption, and dietary behaviors contributing to dental caries. The reliability of the knowledge test was found to be 0.75, while the attitude and behavior questionnaires showed Cronbach's alpha coefficients of 0.75 and 0.85, respectively (Cochran, W. G., 1975). Data analysis was conducted using frequency, percentage, mean, standard deviation, chi-square tests, and Pearson correlation.

The study revealed the following key findings:

1. Most participants had a moderate level of knowledge (40.00%), poor attitudes (61.00%), and low levels of dietary behaviors contributing to dental caries (52.00%).
2. Factors associated with dietary behaviors contributing to dental caries (Lorprasit, P., 2004) indicated a very weak negative correlation between attitudes toward food consumption and dental caries ($r = -0.205$, $p < 0.05$). Parental occupation, income, students' knowledge, and birth order were not significantly correlated with dietary behaviors related to dental caries.

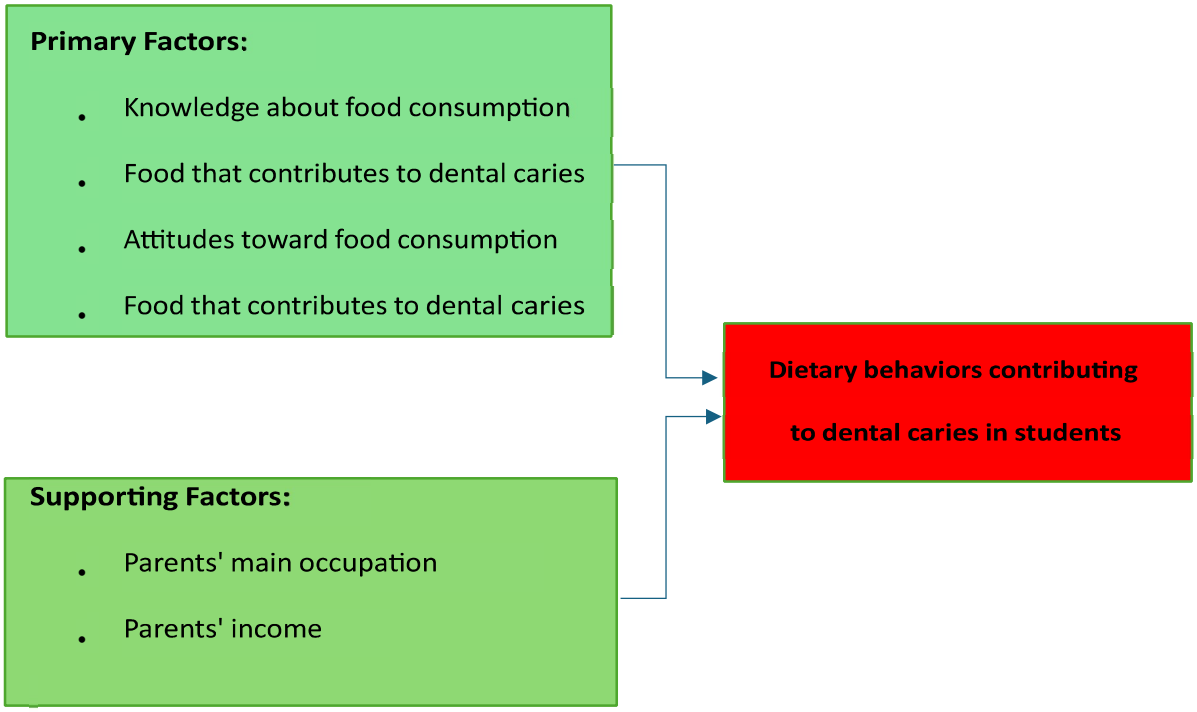
Keywords: Dietary behavior, Dental caries, Primary school students

Introduction

Oral health issues are a significant public health concern, particularly among primary school students. One of the most prevalent and critical public health issues in this age group is dental caries, especially in children around the age of 12, who require special attention to prevent tooth decay as they begin to develop a full set of 28 permanent teeth.

A major risk factor contributing to the prevention and control of dental caries in this group is the consumption of carbonated soft drinks and sugary beverages. These beverages negatively impact oral health because, in addition to their high sugar content an important cause of dental caries (J Dent Res, 2016) carbonated drinks have a high acidity level, with a pH range of approximately 2.70-3.00, which can contribute to tooth erosion. Soft drinks are widely consumed and popular among children, with 46.50% of children aged 10-12 drinking soda occasionally, and 8.30% consuming it daily. Poor oral health can affect children's quality of life and economic well-being, as well as hinder their development and growth.

Educational efforts to raise awareness among parents have not succeeded in changing children's dietary behaviors. Consequently, this study seeks to explore strategies to address dental issues in children.



According to a survey by the Ministry of Public Health's Health Data Center (HDC), only 22.7% of 12-year-old primary school students received oral health examinations and treatment planning between January and June 2022, which is below the target of 50%. Additionally, 24.30% of these students had dental caries. Therefore, this study aims to investigate the factors associated with dietary behaviors that contribute to dental caries in primary school students in Nonthaburi province. This research will provide a foundation for identifying preventive measures and solutions for addressing dental caries in this student population.

Research Objectives

1. To study the levels of knowledge, attitudes, and dietary behaviors that contribute to the development of dental caries among primary school students in Nonthaburi province.
2. To investigate the factors associated with dietary behaviors that influence the occurrence of dental caries among primary school students in Nonthaburi province.

Conceptual Framework

This study explores the dietary behaviors that contribute to dental caries among primary school students in Nonthaburi province, based on the PRECEDE–PROCEED Model by Green & Krueter (1999). According to this model, an individual's health behavior is influenced by various factors, and efforts to change behavior require the consideration of primary and secondary factors that promote behavioral change.

Figure 1: Research Conceptual Framework

The factors influencing dietary behavior that lead to dental caries can be categorized into primary factors and supporting factors as follows:

Research Methodology
This study employs a descriptive research design.

Population and Sample
The population for this study consists of 5th and 6th grade primary school students aged 10-12 years from Nonthaburi province. The sample includes 200 students selected from this population.

Research Instruments
The data collection tool used in this study was a questionnaire, developed by the researcher based on a literature review and framed around the independent and dependent variables. The questionnaire is divided into four sections:

- **Section 1**: General information about the participants, which includes three items on gender, age, and parents' main occupation.

- **Section 2**: Knowledge about food consumption and its effects on dental caries, consisting of 20 true/false items. One point is awarded for each correct answer,
  and zero points for incorrect answers. The knowledge level is categorized based on Cajoris' Method into three levels:
  - Less than M – 0.50 SD (<12.70 points): Low knowledge level
  - Between M ± 0.50 SD (12.70 - 15.05 points): Moderate knowledge level
  - Greater than M + 0.50 SD (>15.05 points): High knowledge level

- **Section 3**: Attitudes toward food consumption and its impact on dental caries, consisting of 20 items measured using a Likert scale with three options: Agree, Neutral, Disagree. The total score is 20 points. The attitudes are categorized using Cajoris' Method as follows:
- <M score (<2.01 points): Negative attitudes
- ≥M score (≥2.01 points): Positive attitudes

- **Section 4**: Dietary behaviors, divided into:
  4.1: Dietary behaviors contributing to dental caries, consisting of 10 items scored on a 3-level scale:
  Regular consumption = 2 points
  Occasional consumption = 1 point
  Never consumed = 0 points
  - **4.2**: Dietary behaviors that do not contribute to dental caries, consisting of 10 items scored on a 3-level scale:
    Regular consumption = 0 points
    Occasional consumption = 1 point
    Never consumed = 2 points

The behavioral level is categorized using Cajoris' Method as follows:
< M score (<1.03 points): Low-risk dietary behavior
≥ M score (≥1.03 points): High-risk dietary behavior

Data Collection Procedure

1. The researcher sought permission from the parents of 5th and 6th grade students aged 10-12 years in Nonthaburi province.
2. The researcher explained the questionnaire's data collection method, including guidelines, techniques, and steps, ensuring that students fully understood the process before they completed the questionnaire on their own.
3. The researcher collected the data from the selected sample according to the research plan and conducted the data collection personally.
4. After each round of data collection, the researcher checked the accuracy of the data in sections 1 through 4. If any information was incomplete, additional data were gathered until complete.
5. The researcher successfully collected data from all 200 participants, representing 100% of the sample. The collected data were then analyzed statistically, and the results were summarized.

Data Analysis

1. General data, knowledge levels, attitudes, and dietary behaviors contributing to dental caries in 5th and 6th grade students aged 10-12 years in Nonthaburi province were analyzed using frequency, percentage, mean, and standard deviation.
2. The relationship between parents' occupations and students' dietary behaviors contributing to dental caries was analyzed using the Chi-Square test.
3. The relationships between parents' income, students' knowledge, attitudes, and dietary behaviors contributing to dental caries were analyzed using Pearson's correlation. The strength of the correlations was classified based on Hinkle's (1998) criteria as follows:

   r = 0.90-1.00 indicates a very high correlation
   r = 0.70-0.90 indicates a high correlation
   r = 0.50-0.70 indicates a moderate correlation
   r = 0.30-0.50 indicates a low correlation
   r = 0.00-0.30 indicates a very low correlation

Before inferential statistics were analyzed, a normality test was conducted, confirming that the data were normally distributed.

Research Ethics

For this study, parental consent was obtained prior to conducting the research, as the participants were under 18 years old.

Research Results

1. **General Information of the Sample Group (200 participants)** o **1.1 Gender**:
   Male: 120 participants (60%) Female: 80 participants (40%)

- **1.2 Age Group**:

10 years old: 45 participants (22.5%) 11 years old: 78 participants (39.0%)
12 years old: 77 participants (38.5%)

- **1.3 Parents' Main Occupation**:

  Company employees: 65 participants (32.50%)

Government officers: 62 participants (31.00%)
Self-employed/business owners: 42 participants (21.00%)
Other occupations: 31 participants (15.50%)

2. **Knowledge Levels Regarding Food Consumption and Its Impact on Dental Caries in Students**

Table 1: The number and percentage of 5th and 6th grade primary school students based on their knowledge levels regarding food consumption contributing to dental caries.

Knowledge Level	Number (n=200)	Percentage (%)
Low	62	31.00
Moderate	80	40.00
High	58	29.00

SD = 3.26

From Table 1, it was found that the majority of 5th and 6th grade primary school students had a moderate level of knowledge, accounting for 40.00%, followed by a low level of knowledge at 31.00%.

3. **Attitudes toward food consumption related to dental caries in 5th and 6th grade primary school students**

Table 2: the number and percentage of 5th and 6th grade primary school students based on their attitude levels regarding food consumption that contributes to dental caries.

Attitude Level	Number (n=200)	Percentage (%)
Negative Attitude	122	61.00
Positive Attitude	78	39.00

SD = 0.35

From Table 2, it was found that the majority of 5th and 6th grade primary school students had a negative attitude, accounting for 61.00%, while 39.00% had a positive attitude.

4. **Dietary behaviors contributing to dental caries in 5th and 6th grade primary school students**

Table 3: Number and Percentage of 5th and 6th Grade Primary School Students based on their behavior levels regarding food consumption contributing to dental caries.

Behavior Level	Number (n=200)	Percentage (%)
Low-risk Dietary Behavior	104	52.00
High-risk Dietary Behavior	96	48.00

SD = 0.36

From Table 3, it was found that the majority of 5th and 6th grade primary school students had a low-risk dietary behavior contributing to dental caries, accounting for 52.00%.

5. **Relationship between parents' occupations and dietary behaviors contributing to dental caries in the sample group**

Table 4: The number, percentage, and analysis of the relationship between parents' occupations and dietary behaviors contributing to dental caries in 5th and 6th grade primary school students.

Occupation	High-risk Behavior ≥ 1.03 (Number)	High-risk Behavior ≥ 1.03 (Percentage)	Low-risk Behavior < 1.03 (Number)	Low-risk Behavior < 1.03 (Percentage)
Company employees	35	53.85	30	46.15
Government officers	31	50.00	31	50.00
Self-employed/business owners	19	45.24	23	54.76
Other	15	48.39	16	51.61

$X^2 = 5.250$ P-value = 0.375

From Table 4, it was found that parents' occupations had no relationship with the dietary behaviors contributing to dental caries.

6. **The relationship between parents' income, students' knowledge, and attitudes with dietary behaviors contributing to dental caries in the sample group**

Table 5: Analysis of the Correlation between Parents' Income, Knowledge, and Attitudes with Dietary Behaviors Contributing to Dental Caries in the Sample Group

Variable	Correlation with Dietary Behaviors Contributing to Dental Caries
Parents' Income	0.125
Knowledge about Food Consumption Contributing to Dental Caries	0.128
Attitudes	-0.205

From Table 5, the hypothesis testing results indicate that attitudes toward food consumption contributing to dental caries have a very weak negative correlation with dietary behaviors contributing to dental caries, with statistical significance ($r = -0.205$, $p < 0.05$). It was also found

that parents' income and knowledge about food consumption contributing to dental caries had no significant correlation with dietary behaviors contributing to dental caries.

Discussion

The knowledge level regarding food consumption contributing to dental caries in the sample group was found to be moderate. Most students were aware that consuming sugary foods, such as soft drinks or sweetened beverages, can cause dental caries. However, many students mistakenly believed that consuming salty foods could also cause dental caries and that fruit juice is the most beneficial for dental health. While the majority understood that sugary beverages contribute to tooth decay, they lacked knowledge about foods that do not cause dental caries.

The attitude level regarding food consumption contributing to dental caries was found to be poor. Most students agreed that food particles stuck between the teeth cause dental caries, but many held incorrect beliefs, such as thinking that chewing gum helps exercise the teeth and prevents caries (Br Dent J, 1990).

The dietary behaviors contributing to dental caries in the sample group were found to be at a low level. Students agreed that consuming foods rich in calcium, such as small fish and vegetables like bananas, papayas, kale, and ivy gourd, were beneficial behaviors. These are good habits that should be promoted as part of students' daily routines to help prevent dental caries. Additionally, students should be educated and guided on behaviors that should be avoided, as they may contribute to increased risk of dental caries. These behaviors include drinking soft drinks, sweetened beverages, or flavored milk before bed without brushing, and chewing gum. These foods contain starch and sugar, which are key causes of dental caries. After consuming such foods, students should brush their teeth thoroughly, especially after meals or before bedtime. Using mouthwash after meals may also be recommended.

The relationship between parents' occupations, income, students' knowledge, and attitudes regarding food consumption contributing to dental caries in 5th and 6th grade students in Nonthaburi province:

Knowledge showed no correlation with dietary behaviors contributing to dental caries, which contradicts the hypothesis. This might be because knowledge alone is not a determining factor in dietary behaviors related to dental caries.

Attitudes toward food consumption contributing to dental caries were found to have a very weak negative correlation with dietary behaviors contributing to dental caries. This means that individuals with better attitudes tend to have fewer behaviors that contribute to dental caries, with statistical significance ($r = -0.205$, $p < 0.05$). This finding aligns with Masalu & Astrom's (2001) study, which indicated that attitudes could predict behavior in avoiding sugary snacks and drinks.

Parents' income showed no correlation with dietary behaviors contributing to dental caries, contradicting the hypothesis. This suggests that supportive factors like parents' income do not influence children's dietary behaviors. Other factors may play a larger role, such as students' daily snack allowance, the type of food sold at school, and each student's ability to purchase food. These factors may explain why parents' income does not significantly correlate with students' dietary behaviors contributing to dental caries.

Parents' main occupations were found to have no correlation with dietary behaviors contributing to dental caries, which contradicts the hypothesis. This suggests that factors such as parents' main occupations do not influence dietary behaviors contributing to dental caries. Other factors, such as the time available for parents to supervise their children, parents' education levels, and parents' knowledge about dental health, may have a greater influence on children's dietary behaviors contributing to dental caries.

Application of Research Findings

The research findings indicate that some students still have incorrect knowledge, attitudes, and dietary behaviors regarding food consumption contributing to dental caries. For example, some students believe that certain snacks, chewing gum, and fruit juice are beneficial for dental health. They are also unaware that salty foods can cause dental caries, and that acidic foods can erode teeth.

The study found that attitudes correlate with dietary behaviors contributing to dental caries. Therefore, schools should implement programs to improve students' attitudes toward healthy dietary behaviors that benefit dental health. Such programs could include training sessions on proper eating habits for dental health and nutrition activities that promote oral health. Furthermore, the findings from this study could serve as a foundation for developing preventive measures to reduce dietary behaviors contributing to dental caries in students.

Suggestions for Future Research

Future studies should examine additional factors that influence dietary behaviors contributing to dental caries in 5th and 6th grade students in other areas. Such research could provide further insights into promoting healthy dietary behaviors. Qualitative studies should also be conducted to explore the underlying causes of dietary behaviors contributing to dental caries.

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