Knowledge and Behavior of Family Regarding the Newly Emerging COVID-19 Prevention in Young Children

ความรู้และพฤติกรรมของครอบครัวในการป้องกันการติดเชื้อโควิด-19 ระลอกใหม่ในเด็ก

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Abstract

Between 2020 and 2022, new variants of Coronavirus (COVID-19) were discovered in Thailand. The emergence of new variants, such as BA.2.86, has raised public health concerns and posed challenges to existing precautionary measures due to their increased transmissibility. These variants resulted in an increase in infections among Thai pediatric population. This study aimed to examine the correlation between families' knowledge and preventive behaviors toward COVID-19 for their children. A sample of 113 primary caregivers who had child aged between 2-6 years was recruited. The relationship between knowledge about COVID-19 and preventive behaviors against it was determined using the Pearson correlation coefficient.

The results show a high level of correlation between a family's knowledge and preventive behaviors toward COVID-19 ($r = 0.35$, $p < 0.01$). Moreover, the mean level of families' knowledge about COVID-19 was high (Mean = 0.69, SD = 0.46), while that of families' preventive behaviors against COVID-19 was moderate (Mean = 1.31, SD = 0.74). In conclusion, the results showed that the knowledge of the disease of an individual family directly correlates to the family behaviors used to prevent new COVID-19 variant infections in the pediatric population.

Keywords: COVID-19, Knowledge about COVID-19, Preventive behaviors against COVID-19, Families, Children

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บทคัดย่อ

ในช่วง ค.ศ. 2020-2022 มีการค้นพบสายพันธุ์ใหม่ของไวรัสโคโรนา (COVID-19) ในประเทศไทย การปรากฏของสายพันธุ์ใหม่ เช่น BA.2.86 ได้ก่อให้เกิดความกังวลด้านสาธารณสุขและเป็นความท้าทายต่อมาตรการป้องกันที่มีอยู่ เนื่องจากความสามารถในการแพร่ระบาดที่เพิ่มมากขึ้น สายพันธุ์เหล่านี้ส่งผลให้จำนวนผู้ติดเชื้อในประชากรเด็กไทยเพิ่มขึ้น การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างความรู้ของครอบครัวกับพฤติกรรม การป้องกัน COVID-19 สำหรับบุตรหลานของตน โดยกลุ่มตัวอย่างคือผู้ดูแลหลักจำนวน 113 คน ซึ่งมีเด็กอายุระหว่าง 2–6 ปี การวิเคราะห์ความสัมพันธ์ระหว่างความรู้และพฤติกรรมการป้องกัน COVID-19 ใช้สถิติสัมประสิทธิ์สหสัมพันธ์เพียร์สัน

ผลการศึกษาพบว่ามีความสัมพันธ์ในระดับสูงระหว่างความรู้ของครอบครัวกับพฤติกรรมการป้องกัน COVID-19 ($r = 0.35$, $p < 0.01$) นอกจากนี้ ความรู้เกี่ยวกับ COVID-19 ของครอบครัวอยู่ในระดับสูง (Mean = 0.69, SD = 0.46) ขณะที่พฤติกรรมการป้องกัน COVID-19 ของครอบครัวอยู่ในระดับปานกลาง (Mean = 1.31, SD = 0.74) สรุปผลการศึกษา พบว่า ความรู้เกี่ยวกับโรคของแต่ละครอบครัวมีความสัมพันธ์โดยตรงกับพฤติกรรมของครอบครัวในการป้องกันการติดเชื้อจากสายพันธุ์ใหม่ของ COVID-19 ในประชากรเด็ก

คำสำคัญ: โควิด-19 ความรู้เกี่ยวกับโรคโควิด-19 พฤติกรรมการป้องกันโรคโควิด-19 ครอบครัว เด็ก

Introduction

COVID-19 and its variants, mainly transmitted through respiratory droplets and aerosols, are released when an infected individual coughs, sneezes, speaks, sings, or breathes. The virus can survive on certain surfaces for hours, and when individuals come into contact with these surfaces, the virus can enter the body through the eyes, nose, or mouth and ultimately reach the lungs.[1] As a result, COVID-19 spread rapidly worldwide, causing more than 2 million infections and 134,371 deaths globally between January 13 and April 15, 2020 (6.50% mortality rate), while Thailand reported 2,643 cases and 43 deaths during the same period.[2]

In response to the COVID-19 outbreak, the Ministry of Public Health implemented aggressive education, prevention, and isolation strategies to reduce infections, hospitalizations, and mortality; however, despite these efforts, a new outbreak of COVID-19 variants emerged in Thailand in December 2020, resulting in a more severe wave of infections.[3] The majority of newly diagnosed cases involved middle-aged adults and older adults. Although the incidence of infection and mortality rate among children were initially lower than those observed in adults, concerns remained that the virus could spread rapidly among children in the absence of robust preventive measures.[4] This situation is particularly concerning for young children under the age of 5 years, who are unable to care for themselves independently and therefore rely heavily on parents or caregivers for

protection, especially those with underlying health conditions or weakened immune systems, who are at greater risk of developing severe symptoms and complications from COVID-19.[3,4]

Misinformation and knowledge gaps remain persistent issues that hinder effective prevention efforts, as many parents are unaware of how to properly protect their children, particularly young children, from COVID-19, often holding misconceptions such as believing that children cannot become infected or that mask-wearing is unnecessary, while others may not understand how to implement proper hygiene practices or encourage preventive behaviors in young children. Moreover, the spread of misleading information, including false beliefs that certain treatments or remedies can prevent COVID-19, further contributes to ineffective practices and increases children's risk of infection.[5] This study aims to examine the relationship between education, behavior, and disease awareness, with a particular focus on how families' understanding of COVID-19 and its variants influences their preventive measures in protecting young children from COVID-19 transmission, especially considering that no vaccines were available for this age group during the early outbreaks and that, although vaccines are now available for children as young as 6 months old, access and uptake remain limited in many areas.[4]

Research Objective

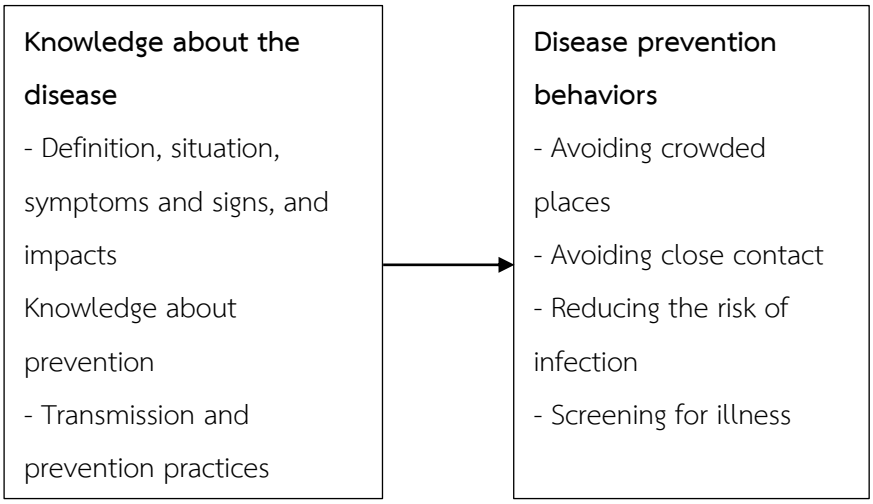
To examine the correlation between families' knowledge and preventive behaviors toward COVID-19 for their children.

The Conceptual Framework

Based on the literature review and prior research, the conceptual framework used in this study is as follows: To assess knowledge in preventing COVID-19, the framework of the Centers for Disease Control and Prevention (CDC) was applied.[4] For preventive behaviors toward COVID-19, the Health Belief Model (HBM) was utilized to explain how individuals' perceptions influence their health behaviors by examining how families' knowledge shapes their perceived susceptibility, perceived severity, perceived benefits, and perceived barriers related to COVID-19 prevention in young children, while these perceptions, together with cues to action such as health information and media messages, influence families' adoption of preventive behaviors; therefore, the HBM served as the analytical framework for investigating the relationship between families' knowledge and their preventive behaviors toward COVID-19 in young children.[6]

According to the CDC, family knowledge about preventing infection should include awareness of transmission methods, the importance of hygiene practices, and social distancing measures, emphasizing that families need to be well informed in these areas to take effective

precautions against infection.[4] Similarly, the Health Belief Model (HBM) serves as a guide for understanding preventive behaviors by explaining how factors such as perceived susceptibility to COVID-19, perceived severity of the illness, perceived benefits of preventive actions, and perceived barriers to adopting such actions influence behavior, while emphasizing the importance of individuals' beliefs and perceptions in motivating them to engage in preventive measures such as vaccination, mask-wearing, and avoiding crowded places.[6]



Study Methods

This research is cross-sectional in that it studies the correlation between families' knowledge and preventive behaviors toward COVID-19 for their children.

The population studied in this research consists of family members who are the primary caregivers of children aged 2-6 years in the area under the jurisdiction of the Tha Sut Subdistrict Administrative Organization, Muang district, Chiang Rai province, totaling 113 people. Chiang Rai province was chosen because it is a border area with diverse populations and family structures, where grandparents or older relatives often serve as primary caregivers of young children. The selected community, located in a semi-urban area, faced challenges in accessing health information and maintaining preventive behaviors due to mobility and tourism activities during the COVID-19 outbreak. These characteristics make the area an appropriate setting for studying the relationship between family knowledge and preventive behaviors toward COVID-19 in young children.

The sample size was determined using the formula by Krejcie and Morgan.[7] We obtain the following:

$$n = \frac{x^2Np(1-p)}{e^2(N-1) + x^2p(1-p)}$$

n = Sample size, x^2 = Chi-square value at df 1 (3.84 at a 95% confidence level), N = Population size, p = Proportion of the population of interest (0.50), e = Acceptable margin of error (0.05)

Substituting the given values:

$$n = \frac{(3.84)(138)(0.50)(1-0.50)}{(0.05^2)(138-1) + (3.84)(0.50)\,(1-0.50)}$$

= 102 participants

To minimize the risk of participants dropping out, the sample size was increased by an additional 10%, corresponding to 11 participants. As a result, the total sample size was adjusted to 113 participants.

In this study, the preschool teachers were asked to select the sample using simple random sampling. A meeting was held with the teachers beforehand to ensure mutual understanding of the research procedures before the sample selection. Preschool teachers, being familiar with the specific context and participants in their settings, are better positioned to ensure that the sample is representative of the population. By involving preschool teachers in the sample selection process, the research can reduce bias and enhance the relevance of the sample to the specific educational setting. Additionally, this approach helps ensure that the sample accurately reflects the diversity and characteristics of the target population.

The inclusion criteria for the study were: primary caregivers of children aged 2–6 years, regardless of previous COVID-19 infection history, with the highest number of caregiving hours per day, willing to voluntarily participate in the research, and able to communicate in Thai (speaking, reading, and writing). The exclusion criteria were individuals who were unable to provide information, withdrew from the study, or relocated during the research.

Ethical Approval The study received ethical clearance from the institutional review board (IRB No. EC 21202-19) and adhered to the Declaration of Helsinki principles. All participants, including legal guardians for minors, provided written informed consent for study participation and publication of anonymized data. Participant confidentiality and privacy were strictly maintained throughout the study.

Data Collection Methods The research tool consisted of a self-administered questionnaire created by the researchers. Three experts in the field reviewed the validity of the research questionnaire, including professors specializing in pediatric nursing, pediatricians, and clinical specialists in general medicine. The content validity index (CVI) was calculated to be 0.98. After modifying the questionnaire, following the advice of experts, it was tested with a small sample group that had similar demographics as the study population. This sample of thirty people was tested using Cronbach's alpha coefficient. The confidence value is 0.98. The researchers personally collected the data. This data collection consisted of three parts: 1) Demographic information which included: gender, age, educational level, marital status, occupation, monthly family income, and the ratio between household income and expenses and their source of information about newly emerging COVID-19 infections in children. This data included the relationship of the child and the experiences of family members of patients who were exposed to COVID-19 variants. 2) Personal knowledge about new COVID-19 variants in children was collected using a true-false questionnaire which consisted of two topics: personal knowledge about the new emerging COVID-19 variances in children, and the prevention of same. This questionnaire included a total of twenty-four questions with a scoring rubric as follows: 1 point for a correct answer and 0 points for an incorrect answer. 3) Preventive behaviors used to stop newly emerging COVID-19 infections in children. This survey consisted of a twenty-five-question, multiple-choice questionnaire scored as follows; 2 points for practice frequently, 1 point for practice sometimes, and 0 points for not practicing.

Statistical Analysis The analysis of personal data used statistical distribution, frequency, and percentage. The level of knowledge of the family regarding COVID-19 prevention in children used statistics based on frequency distribution, percentage, mean, and standard deviation. The criteria employed for classifying the average score was based on three levels; a score of 0.00-0.33 indicated a low level of knowledge, a score of 0.34-0.66 signifies a moderate level of knowledge, and a score of 0.67-1.00 indicated a high level of knowledge about preventative activities.

The preventative behavior of the subject families, regarding variants of COVID-19 and its prevention in children, used statistics based on frequency distribution, percentage, mean, and standard deviation. The criteria used for classifying the average score included three levels. A score of 0.00-0.67 indicated a low level of preventive behavior, a score of 0.68-1.34 indicated a moderate level of preventive behavior, and a score of 1.35-2.00 demonstrated a high level of knowledge about disease prevention behavior.

The correlation between families' knowledge and preventive behaviors toward COVID-19 for their children was analyzed using Pearson's correlation coefficient after testing the assumptions of normal distribution for the knowledge and disease prevention behavior variables, with correlation

coefficients (r) ranging from −1 to +1, where 0 indicates no relationship, values less than 0.40 indicate a weak correlation, values between 0.40 and 0.60 indicate a moderate correlation, and values greater than 0.60 indicate a strong correlation.[8]

Study Results

The data collected in this study were divided into four sections: (1) personal information of participants, (2) family knowledge regarding the newly emerging COVID-19 variants, (3) preventive behaviors of families to reduce infections in children, and (4) the relationship between knowledge and preventive behaviors.

Personal information: Most participants were female (69.03%) and aged 31–40 years (53.98%). The majority were grandmother/grandfather (90.27%). In terms of education, participants were almost equally divided between those who had completed high school education (30.97%) and those with a primary school (28.32%). Regarding family income, most reported earning less than 10,000 Thai baht per month. Concerning sources of information, families mainly obtained knowledge about COVID-19 from healthcare providers (30.97%), followed by relatives (26.55%), and neighbor (24.78%). Additionally, about 82.30% of participants reported having at least one family member previously infected with COVID-19. The details are shown in Table 1.

Table 1 Personal information

General characteristics of the sample	Sample (n = 113)	
	Frequency	Percentage
Gender		
Female	78	69.03
Male	35	30.97
Age		
18-30 years old	36	31.86
31-40 years old	61	53.98
41-50 years old	13	11.50
51-60 years old	2	1.77
Over 60 years old	1	0.89
Relationship with children		
Grandmother/grandfather	102	90.27
Parents	8	7.08
Other (e.g., siblings, sister)	3	2.65

Table 1 Personal information (continue)

General characteristics of the sample	Sample (n = 113)	
	Frequency	Percentage
Education level		
Primary school	32	28.32
High school education	35	30.97
Associate's degree	15	13.27
Bachelor's degree	13	11.50
Other (non-formal education)	18	15.94
Monthly family income		
Less than 3,000 Thai baht	7	6.19
3,001-5,000 Thai baht	31	27.43
5,001-10,000 Thai baht	41	36.28
Over 10,000 Thai baht	34	30.10
The source of information about new variants of COVID-19 in children		
Health care providers	35	30.97
Neighbor	28	24.78
Relative	30	26.55
Internet	10	8.85
Books/manuals	3	2.65
Line/Facebook/Other (e.g., television, news websites)	7	6.20
The experiences of family members of patients who were infected with COVID-19		
A family member had COVID-19	93	82.30
No family member had COVID-19	20	17.70

Knowledge level of families regarding the newly emerging COVID-19 variants and disease prevention in children. Overall, the families demonstrated a high level of knowledge about COVID-19 variants (Mean = 0.69, SD = 0.46). Caregivers were particularly knowledgeable about transmission pathways, including the fact that the virus can spread via droplets and through close contact with infected family members. They also correctly understood that asymptomatic individuals can still transmit the virus. However, knowledge gaps were observed. Many caregivers had limited understanding regarding the severity of symptoms in children compared to adults and were uncertain about transmission between children and adults. A considerable proportion also held the misconception that vaccines were available only for individuals aged 18 years or older.

Family preventative behaviors used to prevent the COVID-19 infections in children. In terms of behavior, families demonstrated a moderate overall level of preventive practices (Mean = 1.31, SD = 0.74). They reported consistently ensuring their children wore suitable masks in public, practiced frequent handwashing, and used alcohol-based sanitizers. However, several behaviors were less consistent, such as wearing protective equipment when preparing food, restricting children from playing with unmasked peers, and ensuring mask use during public transportation. The lowest level of adherence was observed in the behavior of children wearing masks at home, which was rarely practiced.

Table 2 Families' knowledge and preventive behaviors toward COVID-19 in children.

Item	Mean score	SD	Overall level of knowledge
Knowledge level of families regarding the newly emerging COVID-19 variants and disease prevention in children (range 0-1)	0.69	0.46	High level of knowledge
Family preventative behaviors used to prevent the COVID-19 infections in children (range 0-2)	1.31	0.74	Moderate level of behavior

The correlation between families' knowledge and preventive behaviors toward COVID-19 in children. The analysis revealed a statistically significant but weak correlation between families' knowledge and their preventive behaviors ($r = 0.35$, $p < 0.05$). This suggests that while higher knowledge contributes to better practices, knowledge alone may not be sufficient to ensure consistent preventive behaviors. Other factors, such as socioeconomic status, cultural practices, and perceived barriers, likely influenced family adherence to preventive measures.

Table 3 Illustrates the correlation between families' knowledge and preventive behaviors toward COVID-19 in children

Variable	The preventive behaviors toward COVID-19 in children		
	r	*p*	Correlation level
Families' knowledge and preventive behaviors toward COVID-19 in children	0.35	< .001*	Weak correlation

Discussion

The results of this study indicate a significant correlation between families' knowledge and preventive behaviors toward COVID-19 in children. In line with the data collected, the majority of the participants in this study were female (69.03%) and aged between 31-40 years, with most obtaining their information about COVID-19 variants from sources such as healthcare workers, relatives, and the internet. This is consistent with previous studies that emphasize the pivotal role of media and health professionals in disseminating crucial health information to the public, especially in times of crisis such as the COVID-19 pandemic.[9] Our findings revealed that the participants had a relatively high level of knowledge regarding COVID-19 variants and their impact on children, particularly concerning the virus's transmission via droplets and the importance of protective measures.[10]

The study also found that family behaviors aimed at reducing COVID-19 transmission among children were generally moderate. While participants demonstrated strong adherence to specific preventive measures such as mask-wearing in public and frequent hand washing, areas like wearing masks at home and preparing home-cooked meals for children were less consistently practiced. This inconsistency may stem from a lack of continuous education or varying levels of perceived risk associated with different settings.[11-12]

One notable finding is the relationship between a family's economic condition and their ability to implement preventive behaviors effectively. With 69.10% of families in the study earning less than 10,000 baht per month, financial constraints emerged as a significant barrier to purchasing necessary protective supplies, such as masks and hand sanitizers. This aligns with prior studies that suggest economic factors play a critical role in influencing health behaviors and can limit the capacity of families to adopt preventive practices.[6,13]

Economic challenges might be compounded by other social factors, such as stress or misinformation, which can further complicate effective health behavior changes.[1,5] Our study revealed a positive correlation between knowledge and preventive behavior, indicating that families with higher levels of knowledge regarding COVID-19 prevention in children were more likely to consistently engage in preventive practices, thereby supporting health behavior theory, which suggests that individuals' health behaviors are influenced by their knowledge, perceived risks, and understanding of prevention strategies.[14] Ensuring that families have accurate, accessible, and timely information about COVID-19 prevention is crucial for promoting better health outcomes and reducing transmission rates, particularly among vulnerable populations such as children.[5] Furthermore, the findings demonstrated moderate adherence to preventive behaviors in several areas, suggesting that

although families were aware of recommended preventive measures, multiple barriers to full compliance remained, including economic constraints, misinformation, and potentially conflicting messages from various information sources, thereby underscoring the need for sustained public health campaigns and educational interventions that not only provide accurate information but also address barriers to the adoption of preventive behaviors.[1,5] In short, our study underscores the critical role of knowledge in shaping family behaviors toward preventing COVID-19 transmission among children, suggesting that improving public health literacy and addressing barriers such as economic hardship and misinformation may strengthen prevention efforts and enhance child protection during the COVID-19 pandemic, while future public health campaigns should prioritize the provision of clear, reliable, and accessible information to empower families to adopt consistent preventive practices, particularly in high-risk environments.[15.16]

Conclusion

This study demonstrates that families caring for young children during the emergence of new COVID-19 variants possessed relatively high levels of knowledge but only moderate preventive behaviors. A significant, though weak, correlation was observed between knowledge and practice, indicating that awareness alone is not sufficient to ensure consistent preventive actions. Broader factors, such as economic limitations, social norms, and access to reliable information, also influence families' ability to protect children effectively.

Strengthening public health literacy, addressing socioeconomic barriers, and providing practical support to families are essential strategies for enhancing preventive behaviors. By empowering caregivers with both knowledge and resources, children can be better protected from the risks of COVID-19 and other emerging infectious diseases.

Conflict of interest

We have no actual or potential competing financial interests or other conflicts of interest.

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