Effects of the Health Belief Model Educational Program on Perceptions and Preventive Behaviors of COVID-19 in Secondary School Students

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ABSTRACT

OBJECTIVE: The research objective was to study the effects of the Health Belief Model Educational Program by comparing the mean score levels, before and after program participation of perceptions to prevent COVID-19 and preventive behaviors of COVID-19 in the secondary school students.

METHODS: This research was quasi-experimental research with one group pre- and post-test design. The 105 samples were the secondary school students of Wat Suttharam Secondary School, Bangkok who were selected by purposive sampling. Research tool was the Becker's Health Belief Model Educational Program. The samples who participated in the program received knowledge of COVID-19 and perceptions to prevent COVID-19 with the application of the Health Belief Model. The program was implemented for 13 hours (3 days). The data were collected by questionnaire and analyzed by percent, mean, standard deviation and paired t-test.

RESULTS: The results showed that, before and after program participation, the samples had a very good level of overall perceptions to prevent COVID-19 scores ($\overline{X}$ = 16.10 and 16.50 respectively) and the score was better after program participation with statistical significance ($p < 0.01$). The samples had a very good level of preventive behaviors of COVID-19 score ($\overline{X}$ = 2.22 and 2.34 respectively) and the score was better after program participation with statistical significance ($p < 0.01$).

CONCLUSION: The Health Belief Model Educational Program on perceptions to prevent COVID-19 and preventive behaviors of COVID-19 was effective. The heath care teams and school teachers could apply the program to promote knowledge of prevention of COVID-19 and respiratory diseases to other secondary school students.

KEYWORDS: COVID-19, perceptions, preventive behaviors, secondary school students

INTRODUCTION

COVID-19 is an emerging disease with the first epidemic found in Wuhan, China in December 2019 and has become pandemic worldwide[1]. It can be easily transmitted by respiratory system and enter lungs. The mortality rate is 1-2%[2]. The risk groups that are easily infected and have a high mortality rate are 60 years and older people and patients with chronic diseases, i.e. respiratory diseases, cardiovascular diseases, cerebrovascular diseases, obesity, cancer, diabetes mellitus and pregnant women[3]. Thailand began prevention and control program by screening body temperature of travelers at international disease control checkpoints since 3 January 2020 after China announced an outbreak of pneumonia of unknown pathogen in Wuhan, Hubei County. The first COVID-19 case was detected in a Chinese traveler on 8 January 2020. On 31 January 2020, Thailand reported

the first COVID-19 Thai patient who was a taxi driver and never went abroad and spread the disease to his family and contact persons. The Public Health Ministry and related agencies were able to contain the infection in a limited area by surveillance and contact case finding. However, COVID-19 was respiratory transmitted disease and there were no effective medicines and vaccines at that time. Therefore, the outbreak occurred in waves[1]. The Department of Disease Control reported[3] waves of COVID-19 outbreak[4]. The first wave occurred during January to November 2020 which was detected at a boxing stadium and gambling dens in Bangkok. There were 3,998 cumulative cases with 60 deaths. The second wave occurred during December 2020 to March 2021. The starting point of this wave was the shrimp central market in Samut Sakhon Province. There were 24,855 new COVID-19 cases and 34 deaths. The mortality rate was 0.14%. The third wave occurred during April to November 2021 with 1,883,161 new COVID-19 cases and 19,111 deaths. The mortality rate was 1.01%. It was the largest wave of outbreak and the starting point was the entertainment venues at Thonglor area in Bangkok. Most of the patients who died had the history of chronic diseases or risk factors such as obesity, pregnancy or older people[1,5]. The older people had a mortality rate of 2.60%. The most common area of outbreak was in Bangkok[6].

According to statistics, the most common mortalities were found in the older people and the risk groups. However, the group of secondary school students also needed particular attention. They usually gathered in a group, in the same classroom and in the same school. Therefore, there were risks of COVID-19 carriers and they could transmit the viruses to their family members. The family members could spread the disease to other people when they went to work outside that might cause another wave of outbreak. COVID-19 outbreak had a major impact on the education system. There were more than 1,500 million students around the world who had to stop going to schools and learning from home

with online learning. There were 70% of youth (age 15-19 years) who experienced increase in stress and anxiety. 27,188 students had no access to online learning. In 2020, there were 57,500 students who dropped out of schools and 65,000 students who dropped out in 2021[7-8]. Since COVID-19 is a contagious respiratory disease, the secondary school students should be urgently promoted with correct knowledge of COVID-19 prevention during the outbreak. The COVID-19 Situation Administration Center (CCSA) reported the decline of the outbreak after the second wave in March 2021[9]. On 31 March 2021 there were only 42 new COVID-19 cases and no death. The government announced the Royal Decree on Public Administration in Emergency Situations B.E. 2015 on 26 March 2020 to control and prevent the disease in 8 measures[1] by applying the Becker's Health Beliefs Model (Becker, 1974)[10].

Becker's Health Beliefs Model explained that perceptions could affect personal health behaviors if a person perceived disease risk and severity with high mortality, he would seek health information and follow the advice. And if he perceived the benefits, he would accept the recommended health action which would lead to appropriate health behaviors. There were several researchers who used Becker's Health Beliefs Model to study perceptions and preventive behaviors in the secondary school students and adolescents with results that benefited the health care system such as Onla, et al[11], Wattanaburanon, et al[12] and Waehayi[13]. However, there were no experimental studies related to Becker's Model and the students' perceptions and preventive behaviors against COVID-19.

The researchers believe that, after the health team provides correct COVID-19 knowledge, prevention and reduction of the disease spread through the Becker's Health Beliefs Model, the secondary school students would practice correct health behaviors and would not become COVID-19 carriers to their families. The research was conducted in the secondary school students in Bangkok
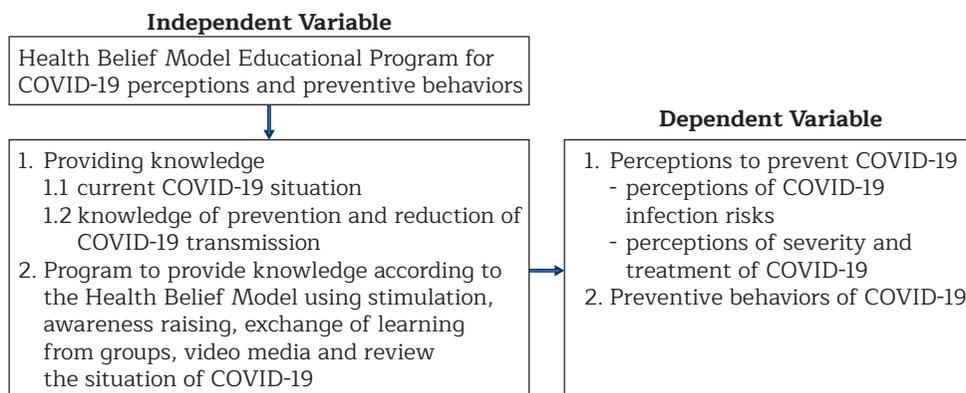
since Bangkok had the highest numbers of older adults and secondary school students[14-15]. The objective of this research was to study the effects of the Health Belief Model Educational Program by comparing the mean levels, before and after program participation of perceptions to prevent COVID-19 and preventive behaviors of COVID-19 in the secondary school students of Wat Suttharam Secondary School, Bangkok. Hypothesis: the secondary school students of Wat Suttharam Secondary School had a higher level of perceptions to prevent COVID-19 and preventive behaviors of COVID-19 after participating in the Health Belief Model Educational Program. The conceptual framework was applied from the Becker's Health Beliefs Model (Becker, 1974)[10]. (figure 1)

METHODS

A Quasi-experimental research with one group pre-test and post-test design was conducted in April 2021 in Bangkok. The study populations were the secondary school students of Wat Suttharam Secondary School with a total of 440 students. The samples were purposively selected from Mathayomsuksa 5 students of Wat Suttharam Secondary School. The inclusion criteria included the Mathayomsuksa 5 students who volunteered to participate in the research on the specified dates with their parents' consents, regardless of genders and grade point averages (GPA). The sample size was calculated by G*Power 3.1.3 Program (Faul, et al)[16].

Prior power analysis was performed by a one-way test with the test power was set to 0.80, the confidence (α) was 0.05, and the effect size was 0.05. The samples size of 27 students were calculated. Since this was a countable, single group and non-mobile population with intention from the class teachers, the researchers purposively selected the samples of 105 students.

The research tools included: the Health Belief Model Educational Program on perceptions and preventive behaviors of COVID-19 which was constructed by the researchers from the concept of Becker's Health Belief Model (Becker, 1974)[10]. The questionnaire to collect data created by the researchers which consisted of 3 parts: Part 1 General information of the samples. Part 2 The perceptions to prevent COVID-19 questionnaire. There were 20 questions in total. The answers were either true (score 1) or false (score 0). The questionnaire consisted of two part: Part 2.1 Risk perceptions of COVID-19 (total scores of 12) to assess the risk perceptions from the area at risk of COVID-19 infection, self-protection when entering a place where there was a risk of COVID-19, traveling in vehicles that were at risk of contracting COVID-19 and risk groups who were carriers of COVID-19. Part 2.2 The perceptions of severity and treatment of COVID-19 (total scores of 8) to assess the perceptions of initial symptoms, severity, treatment and vaccines of COVID-19. The perceptions to prevent COVID-19 scores, overall, part 2.1 and part 2.2 were interpreted as followed.

Independent Variable

Health Belief Model Educational Program for COVID-19 perceptions and preventive behaviors

1. Providing knowledge
   1.1 current COVID-19 situation
   1.2 knowledge of prevention and reduction of COVID-19 transmission
2. Program to provide knowledge according to the Health Belief Model using stimulation, awareness raising, exchange of learning from groups, video media and review the situation of COVID-19

Dependent Variable

1. Perceptions to prevent COVID-19
   - perceptions of COVID-19 infection risks
   - perceptions of severity and treatment of COVID-19
2. Preventive behaviors of COVID-19

Figure 1 Health Belief Model Educational Program for COVID-19 perceptions and preventive behaviors

A very good level was mean at 81-100%, a good level was mean at 71-80% , a moderate level was mean at 61-70%, a low level was mean at 50-59%, and a very low level was mean less than 50%[17]. Part 3 The COVID-19 Preventive Behaviors Questionnaire. There were 14 questions in total. The questionnaire had the reliability of 0.92. Each answer was on a 3-level rating scale: frequently practiced (3), sometimes practiced (2), and rarely practiced (1). The preventive behaviors against COVID-19 scores were interpreted into 3 levels: a good level was 2.33-3.00, a moderate level was 1.67-2.32 and a low level was 1.00-1.66[18].

The quality of the research tools was determined by content validity and reliability. The researchers had three experts in the field of pediatric nursing, adult nursing and geriatric nursing review content validity of the questionnaire and made improvements as recommended by the experts and selected the items that had the Content Validity Index (CVI) equal to or greater than 0.66. The questionnaires were then tried out for reliability with Mathayomsuksa 5 students in other secondary schools in Bangkok. The group of 30 students, who were not the research samples, answered the questionnaire. The reliability of the questionnaire of perceptions to prevent COVID-19 was calculated by KR-20 formula. The reliability of the questionnaire of COVID-19 preventive behaviors was calculated by Cronbach's alpha coefficient. The questionnaire had the reliability of 0.94 and 0.92 respectively.

The research was conducted in April 2021 for the duration of 13 hours (3 days)[1,4,7]. The period was after the second wave of outbreak with the decline of COVID-19 infection. The research experiment was conducted in a conference room of Wat Suttharam Secondary School, Bangkok which was a tall and large hall. The electric fans were used instead of air conditioners. There was a distance of 1.50 meters between each seat and each student must wear a mask all the time. The research experiments included:

Activity 1/ day 1 (duration 5 hours)

9:00-10:00 a.m. - Building relationships, clarifying research objectives and pre-test

10:00-12:00 a.m. - Providing information on the COVID-19 situation as of 1 April, 2021[1,19] and the situation in order of the occurrence of COVID-19 infections and deaths of the first, the second and the third wave of outbreaks[1,4].

1.00-3:00 p.m. - Providing information and knowledge on the topic of the nature of COVID-19 virus, the survival time of the virus in different environment, symptoms and signs of infection, disease transmission, danger and severity of the disease. The samples watched the two sets of video media on "Get to know and how to prevent Coronavirus disease (COVID-19)[20]" and "Thai children unite to fight against COVID-19[21]".

Activity 2/Day 2 (duration 5 hours)

9:00-11:00 a.m. - Providing knowledge on the topic of the severity of the new Coronavirus compared to other Coronaviruses, meaning and understanding of contact cases, patients and close contacts, treatment and disease prevention with vaccines in general population, children, adolescents and working people, and self-care during the COVID-19 outbreak.

11:00-12:00 a.m. - Giving information, knowledge, practice to prevent infection and reduce the spread of infection on the topic of self-observation, disease prevention for the general public, asymptomatic cases, behaviors of the persons with respiratory symptoms i.e. fever, cough, runny nose, sneezing and sore throat, and behaviors of the persons at risk of infection with a new strain of COVID-19 virus without symptoms.

1:00- 3:00 p.m. - Providing information and knowledge on daily living to be safe from COVID-19 with the personal hygiene care guidelines using the DMHTT principles to prevent and reduce the spread of COVID-19 in the following topics: 1) spacing 2) wearing a cloth mask 3) frequent hand washing 4) separation of personal belongings 5) choices of food 6) regular exercise and relaxation 7) checking body

temperature regularly 8) using the Thai Chana App and 9) self-observation for COVID-19 screening[1]. The samples watched the third set of video media on "How to protect yourself from COVID-19[22]".

During the lectures, the researchers encouraged the samples, raised awareness, exchanged learning from the groups and showed video materials on COVID-19 risks, disease severity, benefits and barriers to treatment. The samples were encouraged to share possible solutions or alternatives to solve the problems and obstacles to behave safely when they were away from home. Then the researchers advised the samples to apply the knowledge received from the 2-day group participation to protect themselves from COVID-19 in daily living.

Activity 3/ 7 days from day 1 (duration 3 hours)

9.00-10.00 a.m. - Building relationships and post-test with the same set of questionnaire.

10.00-12.00 a.m. - Reviewing the perceptions of COVID-19 acquired during the past 2 days of program participation and the problems in applying the knowledge into practice by open group discussion with the researchers.

Data analysis for general information was described by percent. Comparison data of perceptions to prevent of COVID-19 and preventive behaviors of COVID-19, before and after program participation, were analyzed by mean, standard deviation and paired t-test.

This research received certificate of ethics code COA.2-012/2022 from Rajabhat Suan Sunandha University. For protection of samples' rights, the researchers conducted the research by taking into account the confidentiality and the impact on the samples throughout the research with the informed consents from the parents to participate in the program.

RESULTS

General information of the samples: there were 105 samples who were Mathayomsuksa 5 students of Wat Suttharam Secondary School. There were 45 samples (42.85%) who had a grade point average (GPA) 3.00-3.49. 80 samples (76.18%) were 17 years old and 69 samples (65.71%) were males. There were 51 samples (48.57%) whose fathers graduated from secondary schools and 73 samples (69.52%) whose fathers were employees. There were 54 samples (51.42%) whose mothers finished primary schools and 74 samples (70.47%) whose mothers were employees. There were 84 students (80.00%) who received knowledge of COVID-19 from television and 55 students (52.38%) whose family incomes were sufficient.

Comparing the mean score levels, before and after participating in the Health Belief Model Educational Program on perceptions to prevent COVID-19. The results showed that, before and after program participation, the samples had a very good level of overall perceptions to prevent COVID-19 scores ($\overline{X}$ = 16.10 and 16.50 respectively and the score was better after program participation with statistical significance (p < 0.01) as Table 1. The perceptions of COVID-19 categorized by items of the risk of infection showed that the samples had a good level of the risk of infection score ($\overline{X}$ = 9.46) before program participation. After program participation, they had a very good level of perceptions of the risk of infection score ($\overline{X}$ = 9.73) which was better than the score before program participation with statistical significance (p < 0.01). The perceptions of the severity and treatment before and after program participation scores ($\overline{X}$ = 6.63 and 6.77 respectively) were at a very good level and the score was better after program participation with statistical significance (p < 0.01) as Table 1.

Comparing the mean score levels, before and after participating in the Health Belief Model Educational Program on preventive behaviors of COVID-19. Before program participation, the samples had a moderate level of preventive behaviors of COVID-19 score ($\overline{X}$ = 2.22). After program participation, they had a good level of preventive behaviors of COVID-19 score ($\overline{X}$ = 2.34) which was better than the score before program participation with statistical significance (p < 0.01) as Table 1.

Table 1 Comparison of perceptions to prevent COVID-19 and preventive behaviors of COVID-19 in the secondary school students, before and after program participation

Items	Total level	Mean	SD	Interpretation	Paired t-test
Perceptions to prevent of COVID-19					
- Overall					
After program participation	20	16.50	2.41	Very good	6.67**
Before program participation	20	16.10	2.22	Very good	p < 0.01
- Risk of infection					
After program participation	12	9.73	1.78	Very good	5.62**
Before program participation	12	9.46	1.72	Good	p < 0.01
- Severity and treatment					
After program participation	8	6.77	1.17	Very good	3.27**
Before program participation	8	6.63	1.06	Very good	p < 0.01
Preventive behaviors					
After program participation	3	2.34	0.22	Good	7.31**
Before program participation	3	2.22	0.17	Moderate	P < 0.01

**statistical significant at p < 0.01

Abbreviation: SD, standard deviation

DISCUSSION

The results showed that, before and after program participation, the samples had a very good level of overall perceptions to prevent COVID-19 scores ($\overline{X}$ = 16.10 and 16.50 respectively and the score was better after program participation with statistical significance (p ≤ 0.01). The perceptions of COVID-19 of the risk of infection showed that the samples had a good level of the risk of infection score ($\overline{X}$ = 9.46) before program participation. After program participation, they had a very good level of perceptions of the risk of infection score ($\overline{X}$ = 9.73) which was better than the score before program participation with statistical significance (p < 0.01). The perceptions of the severity and treatment before and after program participation scores ($\overline{X}$ = 6.63 and 6.77 respectively) were at a very good level and the score was better after program participation with statistical significance (p < 0.01). The samples had a very good level of preventive behaviors of COVID-19 score ($\overline{X}$ = 2.22 and 2.34 respectively) and the score was better after program participation with statistical significance (p < 0.01). The findings were consistent with the Becker's Health Belief Model (Becker, 1974)[10] which stated that perception affected a person's health. If a person perceived that he was at risk of disease and the severity of the disease had a high mortality rate, he would seek health information and followed the advice. And if a person perceived the benefits of practice, it could lead to proper practice and behaviors. When considering the perceptions to prevent of COVID-19 before participating the program, it was found that the samples already had a good level of perceptions of COVID-19 prevention. It could result from the information from mass media and public relation of the government about COVID-19 disease, its dangers, treatment, prevention, etc. via television, Line application, YouTube and Facebook[23]. The level of perceptions to prevent of COVID-19 was increased after program participation with statistical significance. It showed that the Health Belief Model Educational Program was effective. It could be applied as a model to promote knowledge of other communicable diseases in the future. Program participation helped filling the gap of knowledge in COVID-19 prevention. The program focused on providing the samples the knowledge of COVID-19 related to perceived risk opportunities, disease severity, benefits and obstacles to treatment. As a result, the samples took action and practiced proper COVID-19 preventive behaviors. After participating in the program, the samples had preventive behaviors of COVID-19 increased from a moderate level to a good level with statistical significance. This resulted in appropriate behaviors

to prevent COVID-19 and would not become carriers of COVID-19 that spread the disease to their family members and the public. The finding was consistent with the survey research of Onla, et al[11] which found that the samples of the secondary school students, aged 12-19 years, had a high level of COVID-19 knowledge, perceived severity of the disease and perceptive behaviors of COVID-19 . It was also consistent with Wattanaburanon, et al[12] who found that the secondary school students in Bangkok had a high level of perception of the severity of COVID-19 and perceptive behaviors of COVID-19. And it was consistent with Waehayi who found that teenagers had a high level of perception of the severity of COVID-19 at 87.10% and perceptive behaviors of COVID-19 at 91.40%.

The strengths of this research was the health belief model educational program and generalizability. The health belief model educational program on perceptions and preventive behaviors of COVID-19 was based on the Becker's Health Belief Model (Becker, 1974)[10]. The program provided knowledge in COVID-19 prevention and allowed the samples to share possible solutions for safety behaviors against COVID-19. The generalizability of the research could be applied to other secondary school students to promote COVID-19 prevention.

This research had two limitations. The first limitation was the research design which was quasi-experimental research with one group pre- and post-test design without control group. There was no comparison between intervention and control groups. The result could have confounding variables. The second limitation was no follow-up study of perception to prevent COVID-19 and perceptive behaviors after 6 months of program participation. It was due to the high increase of COVID-19 infection rate from April to November 2021.

CONCLUSION

The research results showed that the Health Belief Model Educational Program was effective. The health team could use the program as a model to promote knowledge of COVID-19 to

other students or other respiratory diseases. However, during the COVID-19 outbreak, the team must consider the appropriate time and prepare a research design that would prevent the spread of COVID-19 during the program implementation.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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DATA AVAILABILITY STATEMENT

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

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