

Health Belief Model Teaching Program for Thalassemia Education in high school students

Sunee Lagampan* Punyarat Lapvongwatana*

Chittima Tharapan** Janthana Nonthikorn***

Lagampan S, Lapvongwatana P, Tharapan C, Nonthikorn J. Health Belief Model Teaching Program for Thalassemia Education in high school students. Chula Med J 2004 Nov; 48 (11): 723 - 35

- Objectives** : *To examine the effectiveness of Health Belief Model (HBM) teaching program on perceptions and blood screening tests for thalassemia among high school students.*
- Setting** : *Two secondary schools in Ratchaburi province.*
- Subjects** : *12th grade students: 45 students in experimental group who received the Health Belief Model teaching program from the researcher and 38 students in the comparison group who received the traditional teaching program from the health provider.*
- Design** : *Quasi-experimental with pretest and posttest, two groups design.*
- Method** : *A 50-minutes-session of 4 activities: concrete experience, reflective observation, abstract conceptualization, and active experimentation, measurement was run on three occasions: before, immediately after the intervention, and at one month.*
- Results** : *HBM teaching program significantly affected all perceived of susceptibility, perceived severity of thalassemia, and perceived benefit-barrier of blood screening practice. The experimental group had significantly increased their perceived susceptibility and perceived severity of thalassemia immediately after than those in the comparison group ($p < 0.001$). The numbers of the students in the experimental group (73.7 %) had taken more blood screening test for thalassemia than those in the comparison group (57.7 %).*

* Department of Public health Nursing, Faculty of Public Health, Mahidol University.

** Maternal and Child Hospital, Health Promotion Center Region 4, Ratchaburi, Thailand.

*** Educational Center Region 4, Ratchaburi, Thailand.

Conclusion : *The use of the participatory learning in HBM teaching program was able to positively change perceived susceptibility, perceived severity of thalassemia, and perceived benefits-barriers of blood screening test.*

Keywords : *Health belief model teaching program, Participatory learning, Thalassemia prevention.*

Reprint request : Lagampan S. Department of Public health Nursing, Faculty of Public Health,
Mahidol University, Bangkok 10400, Thailand.

Received for publication. August 15, 2004.

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

สุนีย์ ละกำปັນ, ปัญญรัตน์ ลาภวงศ์วัฒนา, จิตติมา ธาราพันธ์, จันทนา นนทิกร. การใช้โปรแกรมการสอนตามแบบแผนความเชื่อด้านสุขภาพในการให้ความรู้เรื่อง Thalassemia แก่นักเรียนมัธยมศึกษาตอนปลาย. จุฬาลงกรณ์เวชสาร 2547 พ.ย; 48 (11): 723 - 35

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- ผลการศึกษา** : หลังการทดลอง กลุ่มทดลองมีการรับรู้โอกาสเสี่ยงต่อการเป็นธาลัสซีเมีย การรับรู้ความรุนแรงของโรคธาลัสซีเมีย และการรับรู้ประโยชน์-อุปสรรคของการตรวจคัดกรองพาหะธาลัสซีเมีย สูงกว่าก่อนการทดลองอย่างมีนัยสำคัญทางสถิติ ($p < .001$) และพบว่ากลุ่มทดลองมีการรับรู้โอกาสเสี่ยงต่อการเป็นธาลัสซีเมีย การรับรู้ความรุนแรงของโรคธาลัสซีเมีย สูงกว่า กลุ่มเปรียบเทียบอย่างมีนัยสำคัญทางสถิติ ($< .001$) ส่วนในระยะติดตามผลหลังการให้ความรู้ 1 เดือน พบว่ากลุ่มทดลอง มีการรับรู้ประโยชน์-อุปสรรคของการตรวจคัดกรองพาหะธาลัสซีเมียสูงกว่ากลุ่มเปรียบเทียบอย่างมีนัยสำคัญ แต่การรับรู้โอกาสเสี่ยงและการรับรู้ความรุนแรงไม่แตกต่างกัน นอกจากนี้พบว่าจำนวนกลุ่มทดลองไปรับการตรวจเลือด (ร้อยละ 73.3) มากกว่ากลุ่มเปรียบเทียบ (ร้อยละ 57.9)
- วิจารณ์และสรุป** : โปรแกรมการให้ความรู้นี้ไปใช้ในนักเรียนที่มีระดับการศึกษาใกล้เคียงกันและกลุ่มวัยเจริญพันธุ์กลุ่มอื่น ๆ ในการให้ความรู้เกี่ยวกับการป้องกันโรคธาลัสซีเมีย
- คำสำคัญ** : การใช้โปรแกรมการสอนตามแบบแผนความเชื่อด้านสุขภาพ, การป้องกันโรคธาลัสซีเมีย

Thalassemia is hereditary microcytic anemia which has a high prevalence in Thailand. Approximately, 60,000 people (1 % of total Thai population) suffered from thalassemia disease and 18-24 millions (30-40 %) were carriers. The thalassemia trait group has a high risk of carrying the disease without knowing that they may account for widespread of thalassemia disease. Each year, there are almost 50,000 pregnant women who are at risk for having affected fetuses and one-fourth of them (12,125 children) are born with the disease.⁽¹⁾ The report is supported by the study of Shinhuphak R. and colleagues at Ratchaburi province in 1999⁽²⁾, the result shows that approximately 67 in 239 (28 %) reproductive volunteers of both sexes were carriers and 1 in 239 (0.4 %) were thalassemic patients. Therefore, if health practitioners do not control and prevent the disease, the number of thalassemic patients or thalassemic carriers in Ratchaburi province will be outnumbered in the near future.

Thalassemia has impacts on the affected families, the public health system, and the nation. The families have to pay more money for its treatments, spend more time on care giving for thalassemic children who are vulnerable and may be burdensome to health expenditure and need health care through their entire lives. As for the public health system and the nation in terms of services and budget, thalassemic patients need more blood transfusions along with iron chelating agents; hospitals are thus required to provide more services, use more personals, and increase expenditures.⁽³⁾ The estimation of an annual health budget for thalassemia treatments is around 5,000-6,000 millions baht.⁽⁴⁾ Taking all these regards, prevention and control of

thalassemia is necessary in Thailand.

Accordingly, the primary goal of thalassemia prevention is to reduce the number of infected newborn with the disease⁽¹⁾, and the most effective strategy for thalassemia primary prevention is to conduct a blood-screening test in during the preconception stage. However, a blood-screening practice is not common among reproductive age group. Many people may think that thalassemia is not a dangerous disease due to their lack of knowledge and perception of the disease. This is supported by the study of Nititumyung A. and colleague⁽⁵⁾ who reported that the majority of pregnant women had never talked to their husbands or their relatives about thalassemia prevention. Moreover, several studies revealed that most of the reproductive age groups had low levels of knowledge and perception of the disease.⁽⁶⁻⁷⁾ Therefore, teaching the prevention of the disease is necessary in order to motivate the reproductive age group's perceptions and modify their behaviors.

In this study, the target group was high school students, who would serve the primary prevention purpose of the preconception period. They were enrolled to receive the teaching program of Health Belief Model (HBM) with participatory learning method about thalassemia prevention. The understanding and acknowledgment of the severity of the disease will help motivate these young adults to take a blood-screening test prior to their marriage. Furthermore, this test will help them to make a decision on choosing a safe partner for the safe conception or low risk for getting thalassemia babies. In addition, the result of this study will be more benefit to health practitioners and related others to apply in other risk groups.

Research objectives

This study was designed to examine on whether HBM teaching program affect the perceptions of high school students in term of perceived susceptibility of thalassemia , its severity, the benefits-barriers of blood screening test, and in motivating them to take blood screening test for thalassemia.

Conceptual framework

HBM and participatory learning method were used to guide the study. The model was viewed as potential predictors for individuals who would or would not use preventive measures and to suggest intervention that might increase predisposition of resistant individuals to engage in preventive or health protecting behaviors.⁽⁸⁾ HBM describes that individuals will take action on health behavior to avoid disease if they perceive that: (a) they are personally at risk of having the disease (susceptibility); (b) the occurrence of the disease would have at least moderate severity on their life (severity); and (C) taking a particular action would be beneficial in reducing their susceptibility to or the severity of the condition (benefits). However, the action will not entail overcoming important psychological barriers.⁽⁹⁾ Modifying factors and cues to action refer to the other variables that indirectly influence the health-related behavior especially preventive behaviors.⁽¹⁰⁾

This study applied the concepts of HBM into the teaching program that focuses on perceived susceptibility of thalassemia, perceived severity of the disease, and perceived benefits – barriers of blood screening test for thalassemia; and the actual taking blood screening test for thalassemia. This study also used participatory learning method on concrete

experience, reflective observation, abstract conceptualization, and active experimentation to conduct the program activities.⁽¹¹⁾

Literature review

There was no study on HBM and thalassemia prevention in Thailand; however, there were a few studies either on thalassemia or HBM and health behaviors. Thongrat stated that health perception is positively correlated with health promoting behaviors.⁽¹²⁾ Jantanakul reported that the best variables that could predict behavior were attitude, perceived severity, the relationship and communication, perceived benefits of taking the health action minus the barrier or cost of that action of behavior.⁽¹³⁾ Becker found that mothers who believed that their children were highly susceptible to the recurrence of otitis media were more likely give medication appropriately and keep follow-up appointments than those mothers who did not share the belief.⁽⁸⁾ Fink and colleagues stated that perception of personal susceptibility to breast cancer and belief in the serious nature of the disease augmented participation in a cancer screening program for detection of breast abnormalities.⁽¹⁴⁾

Materials and Method

Research design

This is a quasi-experimental study with two groups pre and post – test designs. Data were collected from high school students three times: before, immediately after, and one month after the intervention.

Population and samples:

The population of the study were the 12th

grade students of the two secondary schools in Ratchaburi province, affiliated to the Department of General Education, Ministry of Education.

The samples were selected by using multi-stage random sampling method from secondary school-cluster to classroom selection according to the following criteria: (1) medium- sized level; (2) similarity in both males and females, numbers of each sex in classroom, and study program; (3) cooperation from the school administrators and the teachers.

The samples were students in mixed math-art programs who showed their interest in participating in the intervention and met with the following inclusion criteria : (1) age between 17-19 years old; (2) having no signs and symptoms of thalassemia (thalassemia face, pale and liver enlargement); (3) consented to participate in all activities of the intervention. The total number of students in the experimental group was 54 students while the comparison group had 51 students. Finally, there were 45 students who remained in the experimental group and 38 students in the comparison group.

Research instruments

1. Data collecting instruments: were divided into 3 parts as follows:

Part 1. The socio-demographic characteristics questionnaire included 10 items of age, sex, students' GPA, education of their parents, family's income, parent's occupation, and experience about thalassemia disease.

Part 2. The thalassemia disease perception's questionnaires included 3 dimensions: (1) perceived susceptibility of thalassemia disease, (2) perceived severity of thalassemia disease, and (3) perceived

benefits-barriers of blood screening test for thalassemia by using the concepts of the HBM. Each dimension of the questionnaire had 10 items with a five-point rating Likert scale ranged from strongly agree to strongly disagree. The instruments were assessed on their content validity by five experts. The reliability of the questionnaires was tested with 40 tried-out students. The Cronbach Alpha Coefficiencies were ranged between 0.65 - 0.87

Part 3. The questionnaires about behaviors on taking blood screening consisted of 2 items. The first item asks about taking or not taking the blood test for thalassemia. The second item asks about the reason for taking or not taking the blood test.

2. Experimental instruments:

The instruments used in the experimental group were teaching plans for promoting the high school's perceptions about thalassemia disease. The contents emphasized upon risks and impacts of thalassemia disease, and benefits-barriers of blood screening test for thalassemia based on the concepts and terms of HBM.

Teaching activity that applied the concept of the participatory learning was performed to maximize the students' participation. This process consisted of 4 components: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The educational media included cassette tape of "Perceived about thalassemia" (Ru Ton Thalassemia), pictures to present the severity of this disease, worksheets for enhancing the student's critical thinking, flip chart about thalassemia disease, and pamphlets. The teaching plan was tried-out with 40 students who had similar characteristics to the sample group.

Procedures and data collection

Preparation steps:

The researchers asked for cooperation on the intervention and data collection from the director of the target schools by having a meeting with them in order to explain them every step of intervention and data collection.

Intervention and data collection steps: 7 weeks duration

During the first week: the socio-demographic data were collected and pre-tested of perception of thalassemia with self-administered questionnaires in both the experimental and comparison groups.

At the third week, a 50-minutes HBM teaching program was conducted by the researcher for the experimental group while for the comparison group, a 50-minutes routine teaching program was conducted by health care providers who were responsible to promote health education in the school. In both groups, after finishing the teaching, the researchers immediately provided the first posttest and gave the students pamphlets about thalassemia for reviewing at home.

At the fifth week, two postcards were sent to each student in both the experimental and comparison groups. The first one was an invitation for the subjects to take blood screening test for thalassemia at the school on the day after. The second one was an informed consent form for their parents to sign.

At the seventh week, a posttest was conducted about behaviors on taking blood-screening test for thalassemia and perceptions on thalassemia by using the same self-administered questionnaires as in the pre-test.

Data analysis

The data were analyzed by using statistics computer program including descriptive statistics, chi-square test, independent sample t-test, repeated measure ANOVA, and Bonferroni's multiple comparison. Kolmogorof-Sminov test was used to test normal distribution of perception variables in both the experimental and comparison groups. The level of significance to reject the null hypothesis was set at 0.05.

Research results

Socio-demographic characteristics

The socio-demographic characteristics of the high school students in both groups were similar in age and sex. The majority of the subjects in both groups were females, 18 years old (ranged 17 – 19 years old). The experimental students' GPA, (ranged 1.50-2.00) was slightly lower than those comparison students (ranged 2.01- 2.50). The majority of the students in both groups received thalassemia information from many sources. Approximately half of the subjects in the experimental group received the information from TV, while the subjects in the comparison group received from newspapers/magazines and buildboards. Their parents had primary education and work as laborers, the total income of their family ranged between 5,001-10,000 baht per month.

When using the chi-square test for homogeneity of socio-demographic characteristics of the experimental and comparison groups, the results indicated that most of the socio-demographic characteristics in both groups were similar except for the sources that the subjects received information about thalassemia information.

Perceptions of thalassemia disease and blood screening practice

Multivariate tests by repeated measure ANOVA showed that there was an overall significant difference between the experimental and comparison groups in their perceived severity of thalassemia disease ($F = 28.41, p < .001$) while perceived susceptibility of thalassemia and perceived benefits-barriers of blood screening were not. On comparing between times, the results indicated that there were overall significant differences on perceived

susceptibility of thalassemia and perceived severity of thalassemia at the 3 times of measurement: before, immediately, and one month after the intervention ($F = 166.65, p < .001$; $F = 114.03, p = .017$, respectively). However, perceived benefits-barriers of blood screening practice was not. There was a statistically significant difference of the interaction of measurement and group of all variables. These means the effect of time within the group and the effect of HBM teaching program were significantly correlated to perceptions (Table 1, Fig. 1, 2 and 3).

Table 1. Multivariate analysis by repeated measure ANOVA of perception variables between the experimental and the comparison groups.

Variables	Group		Time		Time * Group	
	F-ratio	p-value	F-ratio	p-value	F-ratio	p-value
Perceived Susceptibility of thalassemia disease	2.32	.132	166.65	<.001*	13.64	<.001*
Perceived Severity of thalassemia disease	28.41	<.001*	114.03	.017*	4.30	<.001*
Perceived Benefits- barriers of blood screening practice	0.80	.373	32.02	.181	1.74	<.001*

* p-value < .05

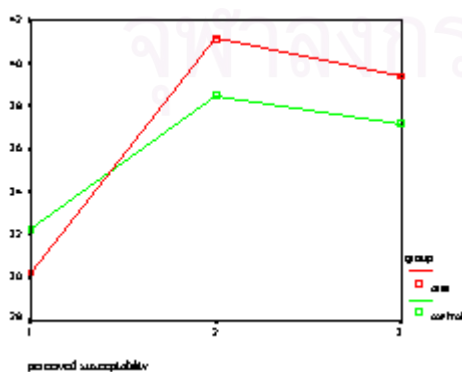


Figure 1. Comparison perceived susceptibility of thalassemia disease between group.

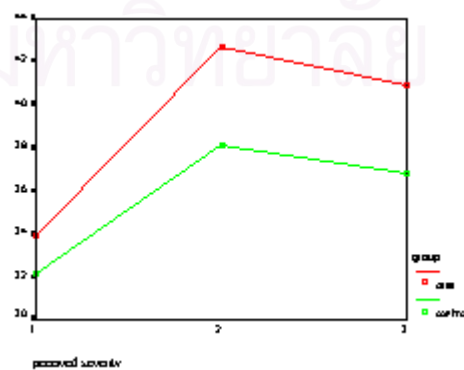


Figure 2. Comparison perceived severity of thalassemia disease between group.

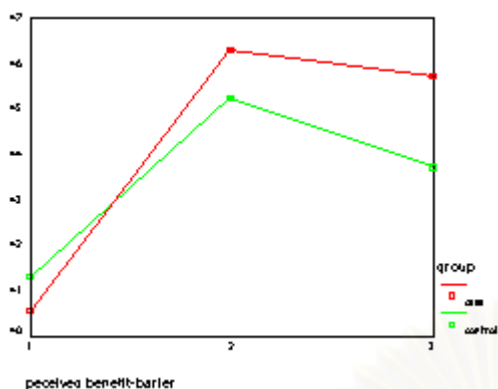


Figure 3. Comparison perceived benefits - barriers of blood screening practice between group.

The results of univariate analysis as follows:
Before the intervention, the experimental group had mean scores of perceived susceptibility of thalassemia and perceived severity of thalassemia significantly different from the comparison group. Whereas, the mean scores of perceived benefits-barriers of blood screening of both groups at before the intervention were not different (Table 2).

The results of the questionnaire taken immediately after the intervention, showed that there were statistically significant differences of the mean

Table 2. Comparison of the mean scores of perceived susceptibility of thalassemia disease, perceived severity of thalassemia disease, and perceived benefits- barriers of blood screening practice between the experimental and the comparison groups.

Variables	Experimental Group (n=45)	Comparison Group (n=38)	t-test (df)	p-value
	Mean ± SD	Mean ± SD		
Before the intervention				
Perceived Susceptibility of thalassemia disease	30.29 ± 2.63	32.31 ± 4.70	2.3 (55.9)	0.022*
Perceived Severity of thalassemia disease	33.93 ± 4.20	32.21 ± 3.54	1.99 (81)	0.049*
Perceived Benefits- barriers of blood screening practice	40.60 ± 4.27	41.31 ± 7.33	0.53 (57.22)	0.598
Immediately after the intervention				
Perceived Susceptibility of thalassemia disease	41.18 ± 3.21 (10.89 ^d ± 3.90)	38.53 ± 3.67 (6.21 ^d ± 4.91)	4.85 (81)	<0.001*
Perceived Severity of thalassemia disease	42.67 ± 3.56 (8.73 ^d ± 4.35)	38.11 ± 3.58 (5.89 ^d ± 4.40)	2.95 (81)	0.002*
Perceived Benefits- barriers of blood screening practice	46.24 ± 3.18	45.24 ± 5.67	0.9 (55.89)	0.168
One month after the intervention				
Perceived Susceptibility of thalassemia disease	39.44 ± 3.31 (1.73 ^d ± 2.96)	37.18 ± 4.34 (1.34 ^d ± 3.70)	0.54 (81)	0.296
Perceived Severity of thalassemia disease	40.91 ± 3.04 (1.76 ^d ± 3.37)	36.79 ± 5.70 (1.32 ^d ± 4.95)	0.46 (63.49)	0.322
Perceived Benefits- barriers of blood screening practice	45.71 ± 3.95	43.71 ± 5.06	1.98 (69.37)	0.026*

* p-value <0.05, d = mean of difference score

difference of perceived susceptibility of thalassemia and perceived severity of thalassemia between the experimental and the comparison groups. While there was not statistically significant differences of mean scores of perceived benefits-barriers of blood screening practice between both groups (Table 2).

At one month after the intervention, the mean differences of perceived susceptibility of thalassemia and perceived severity of thalassemia between the experimental and the comparison groups were not statistically different. On the other hand, there was statistically significant difference of perceived

benefits-barriers of blood screening practice between both groups (Table 2).

Within the group comparison was focused, the results showed that both in the experimental and the comparison groups, the mean scores at immediately and at one month after the intervention of perceived susceptibility of thalassemia disease, perceived severity of thalassemia disease and perceived benefits-barriers of blood screening practice were statistically significant higher than at before the intervention (Table 3).

Table 3. Comparison of perceived susceptibility of thalassemia disease, perceived severity of thalassemia disease, and perceived benefits- barriers of blood screening practice within the experimental and the comparison groups.

Variables	Before	Immediately	One month	F- ratio (p-value)
	intervention	after intervention	after intervention	
	Mean \pm SD	Mean \pm SD	Mean \pm SD	
Experimental Group (n=45)				
Perceived Susceptibility of thalassemia disease	30.29 \pm 2.63	41.18 \pm 3.21 ^{a,c}	39.44 \pm 3.31 ^b	184.316*(<.001)
Perceived Severity of thalassemia disease	33.93 \pm 4.20	42.67 \pm 3.56 ^{a,c}	40.91 \pm 3.04 ^b	89.476*(<.001)
Perceived Benefits- barriers of blood screening practice	40.60 \pm 4.27	46.24 \pm 3.18 ^a	45.71 \pm 3.95 ^b	55.189*(<.001)
Comparison Group				
Perceived Susceptibility of thalassemia disease	32.31 \pm 4.70	38.53 \pm 3.67 ^a	37.18 \pm 4.34 ^b	31.548*(<.001)
Perceived Severity of thalassemia disease	32.21 \pm 3.54	38.11 \pm 3.58 ^a	36.79 \pm 5.70 ^b	33.405*(<.001)
Perceived Benefits- barriers of blood screening practice	41.31 \pm 7.33	45.24 \pm 5.67 ^a	43.71 \pm 5.06	6.662* (.003)

* = p-value <.05

a = Immediately after > Before the intervention at p-value <.05

b = One month after > Before the intervention at p-value <.05

c = Immediately after > one month after the intervention at p-value <.05

Blood screening test for thalassemia

The results showed that there were 35 of 45 students (73.3 %) in the experimental group who actually took the blood-screening test for thalassemia while the number of students in the comparison group was 22 of 38 students (57.9 %). There was no statistically significant difference in taking the blood-screening test between both groups (p -values = 0.069) (Table 4).

The reasons for taking blood screening test for thalassemia in both the experimental and comparison groups were no pay (93.9 %, 87.5 %, respectively), handily receiving services from health personnel at school (90.9 %, 87.5 %, respectively), and beneficial for premarriage planning (66.2 %, 87.5 %, respectively).

The reasons for not taking blood screening test for thalassemia in both the experimental and comparison groups were afraid of needle (58.3 %, 81.2 %, respectively) and afraid of blood result (41.7 %, 18.8 %, respectively).

Discussion

HBM teaching program significantly affected the overall perceived susceptibility and perceived severity of thalassemia, and benefits-barriers of blood screening practice. The experimental group

significantly increased their perceived susceptibility and perceived severity of thalassemia at the time immediately after, and they had higher scores than those in the comparison group, but at one month follow-up these perceptions were slightly decreased in both groups. Therefore, the information given about the disease from the teaching program had significantly affected the students at the short period of time while the benefits-barriers of blood screening practice still sustained with slightly dropping. This implied that one time of HBM teaching was able to trigger the students to perceive the susceptibility and perceived severity of thalassemia for a short time as was the traditional teaching program that was provided in the comparison group. Thus, this is a need to activate the activities repeatedly. Regarding the perceived benefits-barriers of blood screening test at one month after the intervention, the students in the experimental group had significantly higher mean scores than those in the comparison group. This means that the education method that applied to HBM and participatory learning in delivering the information could help the learner to link new knowledge with their old experience on the benefits of the blood screening test, resulted in the sustainability of the perception in the experimental group. The learning activities focused on the participation of the learner on sharing personal

Table 4. The blood result of students who actually took blood-screening test.

The type of blood result	Experimental group (n = 33)	Comparison group (n = 22)
Normal	26 (78.8 %)	19 (86.4 %)
Hb E trait	5 (15.2 %)	3 (13.6 %)
β - thalassemia trait	2 (6.0 %)	0

experience; exchanging thoughts and knowledge, discussing on any doubts about thalassemia with the group. These activities reflected all concepts of participatory learning: experience, reflection of idea and discussion, conceptualization, and application. Especially, the application part was significantly reflected on the students actually taking of the blood test.^(11,15)

The Department of Mental Health⁽¹⁵⁾ stated that a teaching that could give out most benefit results was that a teaching that encourage the learner to participate most. Mitpat⁽¹⁶⁾ reported that the participatory learning process on father's role perceptions among male juvenile delinquents in training schools was better than those who were not trained. Junthasiriyakorn⁽¹⁷⁾ reported that after family health leaders were trained with participatory learning in controlling the larvae of *Aedes aegypti*, they had higher scores of perceived susceptibility and severity of Dengue haemorrhagic fever than those who were not trained.

In addition, the numbers of the students in the experimental group (73.7 %) took more blood screening test for thalassemia than those in the comparison group (57.7 %). Those who did not go to the test reasoned that they were afraid of the needle or did not realize the good of the test. Becker⁽¹⁴⁾ stated that "the decision of taking health action of individuals is not always necessary in accordance with the knowledge and perception but might be attributed to the other factors. The factors dominating the health action include physical condition, social, and emotion".

In summary, this study found that the effects of the both teaching programs were similar in term of

taking health action, but the perceptions were different. On considering the method of information delivery of both teaching programs, the use of participatory learning in HBM teaching program was able to positively change perceived susceptibility, perceived severity of thalassemia, and perceived benefits-barriers of blood screening test better than the traditional teaching program. The participatory learning emphasized on the learner as the center for the learning on delivering the information might be more an appropriate method for the promotion of thalassemia prevention.

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